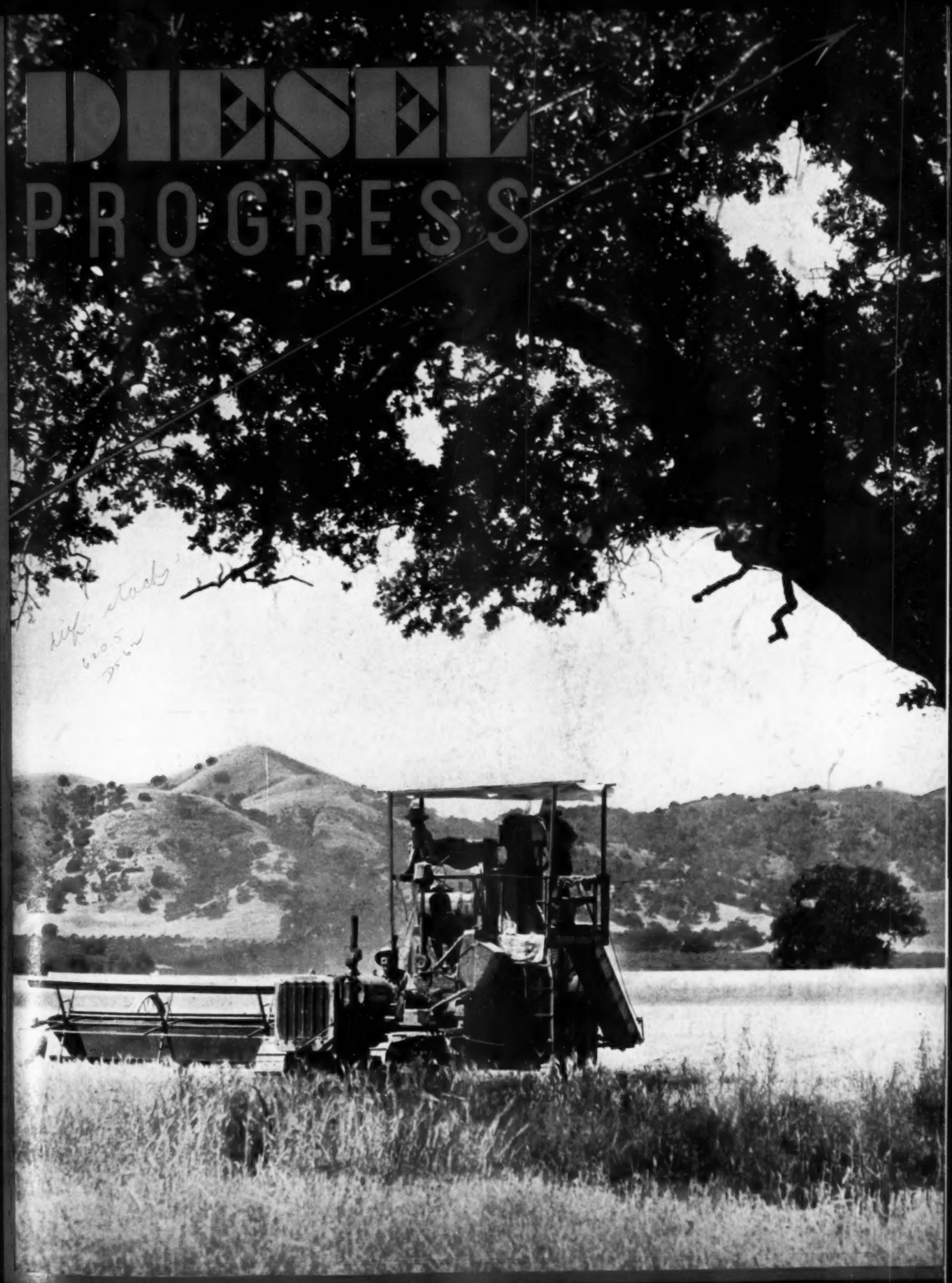
DIESEL PROGRESS



AUGUST, 1941

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AUGUST CONTENTS

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REX W. WADMAN
Editor and Publisher

TABLE OF CONTENTS ILLUSTRATION: Showing a Caterpillar Diesel tractor and LeTourneau bulldozer moving sand to a hopper for loading into freight cars. Operating near Mascot, Tennessee, this unit is helping to build the Cherokee Dam, part of the T. V. A. project, and is working eight hours a day on approximately four gallons of 8c fuel.

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HEYWORTH CAMPBELL
Art Director

LIBERTY, TEXAS LIGHT PLANT

By ORVILLE ADAMS

SEVERAL years before it was actually consummated, the movement for a municipal light and power plant at Liberty, Texas, was started by a group of enterprising citizens. Numerous obstacles were encountered, including a court battle over the franchise. When Public Works Administration officials finally approved the project, the engineering work was placed in the hands of the Garrett Engineering Company, Consulting Engineers, El Paso, Texas. A complete set of plans and specifications, including the power plant, the transmission and distribution system, and other allied projects were worked out, and the contract was let to Mr. J. E. Morgan and Associates, of Houston, Texas. After the work finally got under way, rapid progress was made, the plant was completed, and went into operation in record time.

The power plant and distribution system is one of the most up to date and modern to be found in the entire region and furnishes an example of what modern practice should be. The city of Liberty is located between Houston and Beaumont, Texas, hard by the Gulf coast. This part of the state is subject to high temperatures, coastal climatic conditions, and the terrain offers many difficulties for the construction of foundations, there being a thick bed of quicksand near the surface. The very best foundation engineering was involved in the successful handling of this problem.

The power plant building itself is unique in design, brick and concrete construction, heavily insulated against the high temperatures of the locality, the ceiling being insulated by means of rigid celotex insulation board. The building is ventilated by fans which provide rapidly circulating air and remove excess heat from the engine room. Every provision is made for keeping the machinery and equipment clean, and protected against erosion and rust so prevalent on sea coast equipment.

The fuels, both gas and oil in abundance, are available at prices comparatively lower than in many other regions. The choice of fuels was a problem. Since natural gas was available at prices that compared favorably with that of desirable fuel oils, it was decided to install convertible type engines, and to use natural gas so long as present conditions prevailed.

The engines are Cooper-Bessemer Gas units, which can be converted to strictly modern Diesels within a short time. Since the maximum horsepower rating of the engines was desired, 11½" gas engine cylinders are used in this installation, a set up that takes full advantage of the crankshaft, bearings, connecting rods, and other major parts, which are designed for Diesel operation. When and if these engines are converted from the 11½" gas cylinders to Diesels, the power cylinder liners will be changed to 10½" Diesel liners, involving a change of the pistons, substitution of the injection system in place of the ignition system, but no change is necessary in the cylinder head. Thus, if and when the cost of gas increases beyond a point comparative with fuel oil, or the supply is exhausted, the engines at Liberty can be converted to a full Diesel. Should the unforeseen come to pass, or other conditions incidental to National Defense make drastic changes necessary, the convertible engine offers this flexibility of control. Any disruption of the gas supply will disrupt operation but a short time. The value of such flexibility is becoming more and more recognized in this strategic region. The two engines are rated at 300 hp. each at 400 rpm. and are direct connected to 200 kw., 2300 volt, Westinghouse alternators.

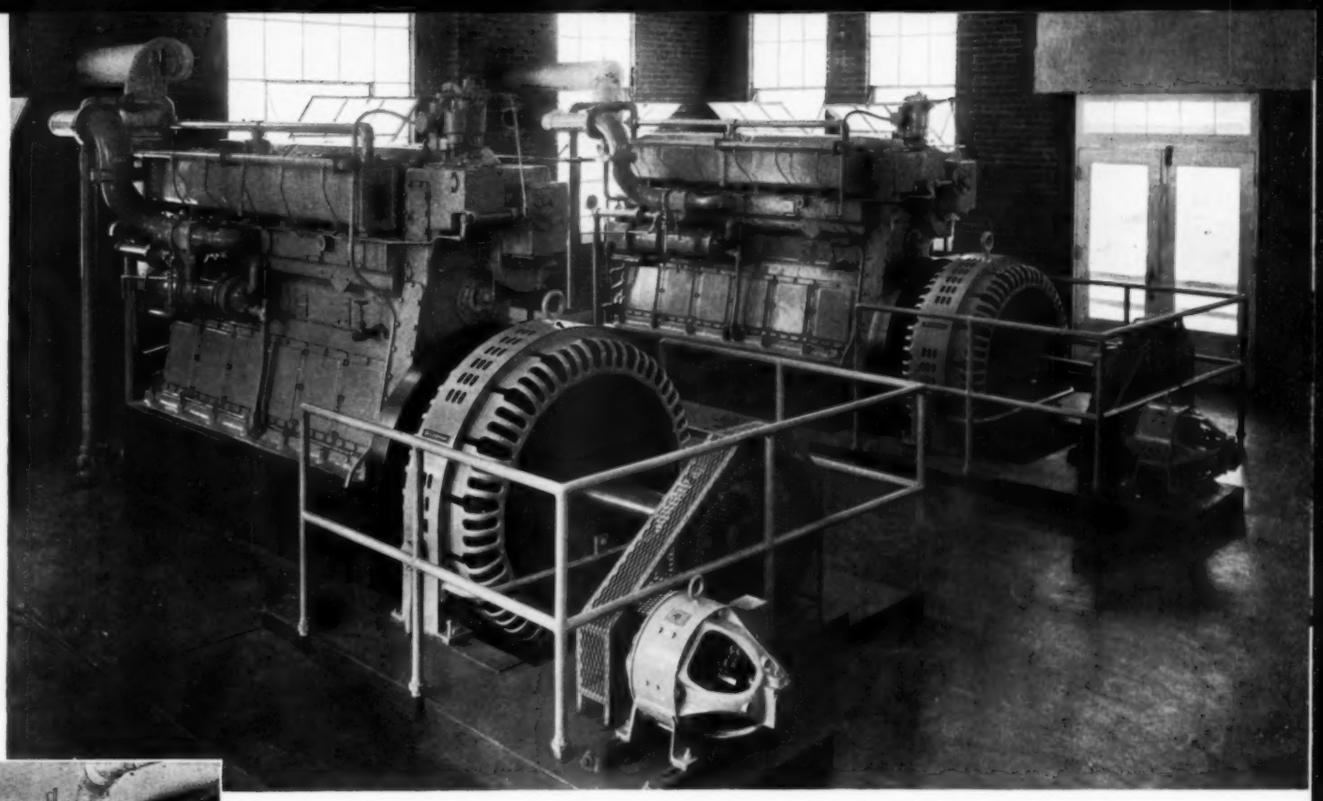
A special feature of these engines is the fuel gas mixing valve and manifold. A specially shaped cast iron intake manifold, worked out by long experience, affords a uniform distribution of the air and gas mixture to the individual power cylinders. The mixing valve is a special adaption of the single balanced butterfly with separate valves for air and gas mounted on a common spindle with provision for easy adjustment of the ratio of fuel to air. This mixing valve is connected to the governor, which then controls the quantity of a constant mixture to maintain a constant speed with varying loads on the engine.

The modern building which houses the Liberty municipal power plant.

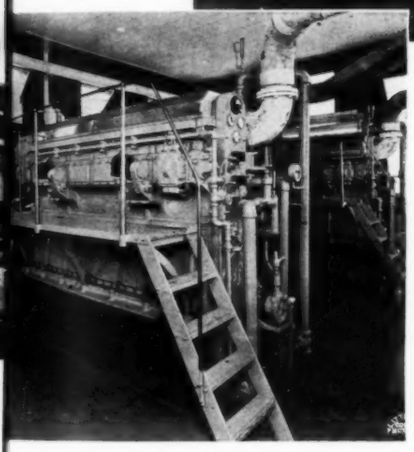
In connection with the ignition system, a high tension rotary type Bosch magneto is driven by a silent chain from the camshaft. An impulse coupling is built into the magneto to give full voltage when starting at low speeds. The spark plugs are located in the center of each cylinder head. When operating on gas, a low pressure gas regulator for reducing the fuel gas pressure from approximately 8 oz. to atmospheric is furnished with the engine.

The governor is a Pickering, centrifugal spring balanced type, completely enclosed in the end housing. It is also chain driven from the camshaft, and is of special variable speed designed to maintain constant control throughout the range of engine speeds.

The lubricating system is fully automatic, comprised of a built-in lubricating oil pressure pump that circulates the oil from the sump tank located outside the engine, through the filter, through the cooler, and delivers it under



The two C-B gas engines and Westinghouse generators. Note Pickering governor on each engine.



View of operating ends of the two Cooper-Bessemer gas engines. Note Alnor pyrometer on each engine.

pressure to each main bearing, thence through the drilled crankshaft to all connecting rod bearings, then through drilled connecting rods to the wrist pins and cylinder walls. All the camshaft bearings, push rod rollers, rocker arms, and governor drive are pressure lubricated by the same means.

The lubricating oil is continuously reclaimed by a Skinner lubricating oil reclaimer. A Purolator filter is also fitted in the oil line ahead of the cooler. There is very little contamination of the lubricant from the gas fuel, the colloidal carbon is removed and the original color, stability, and viscosity of the lubricating oil is continuously maintained.

The intake system is equipped with American air filters located on the outside of the building, properly housed and screened against the entrance of excessive wind-borne foreign matter. Air reaches the engines through horizontal intake manifolds extending from the engine room walls direct to the engine with only long sweep turns. The filter resistance has been reduced to the lowest possible point, and a full supply of clean air enters the engines at all times.

The same piping arrangement for the exhaust lines was provided to conduct the exhaust direct from the headers to the Maxim silencers on the outside of the building. Alnor pyrometers, mounted on each engine gauge panel, indicate the exhaust temperature of each cylinder. The cooling system involved provision for closed circulation and water softening.

The cooling tower is a Marley baffle type with coils. These coils are cooled by means of spray nozzles. Duplicate circulating pumps for both soft and raw water provide ample safety of the system. A deep-well close by the tower supplies all the water used in the plant. The water is naturally hard, and a moderate degree of softening is essential to avoid formation of scale, deposits and accumulation of algae. The system is more satisfactory than surface water, which in this region is not entirely satisfactory and is rarely used.

A regular Zeolite softener is used to remove solids and minerals from the water and regular inspection shows no appreciable deposit of scale.

The automatic controls on the lubricating oil pressure, as well as the cooling water lines, are actuated by Mercoid switches, with alarms to indicate any disarrangement in these systems. The modern switchboard is fully enclosed with special provisions for the protection of the instruments and switchgear, being the dead-front type. The instruments are the recording or indicating type and are mounted in full view of the operating position. Much of the board is housed in a special switchboard compartment designed to assure ample protection of the wiring system.

The transmission and distribution system is designed to afford more than the usual efficiency, and a higher degree of protection against weather hazards and blackouts. Much of the distribution around the plant is underground, while ample control equipment provides a high degree of safety and efficiency.

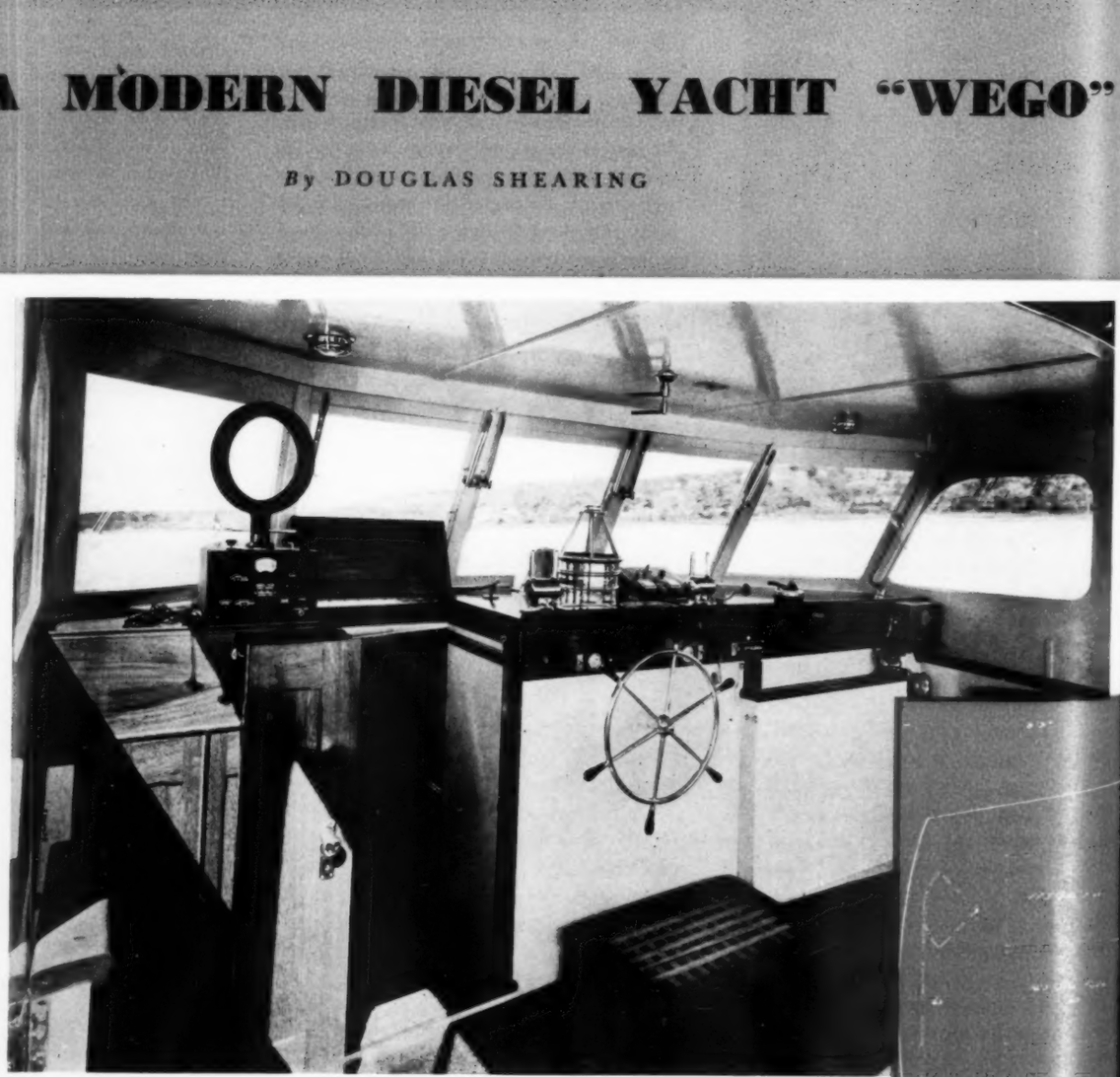
The prospective earnings of the plant have made possible the further development and improvements of various city projects, including better equipment for the various departments, the addition of facilities to take care of more remote sections of the community, extensions of the various utilities to outlying sections of the city, increased street lighting facilities, and additional lighting for municipal institutions.

The citizens, under leadership of its Mayor, Mr. Brad Pickett, look forward to a continuous development of the town, and increasing facilities at lower cost to the community.

Kermath Diesel engined cruiser "Wego" on trials in the Hudson River. Only 61' overall, she is more completely equipped than any vessel of her size.

ULTRA MODERN DIESEL YACHT "WEGO"

By DOUGLAS SHEARING



Pilot house of "Wego" showing the ship-to-shore telephone, Bendix remote engine room control, automatic log and photo electric pilot. The excellent visibility for the helmsman needs no comment. Across the page: Deck plan showing interesting arrangement of quarters.

IT can be said that the new Diesel cruiser *Wego* is one of the world's safest and most modern pleasure craft and is the most completely equipped vessel of her size and service. In fact, this favorable comparison can be extended to include the majority of yachts regardless of size, since "Wego" has some equipment never before used for marine service.

John H. Wells, Inc., New York Naval Architects, have successfully interpreted the wishes and ideas of Mr. Powel Crosley, Jr. to incorporate in a 60 foot cruiser all elements of a large yacht plus certain unusual features which make her unique among sport cruisers.

"Wego" was built at the yard of Julius Peterson at Nyack, New York, and has the following principal dimensions: L.o.a. 61′, Beam 16′, Draft 4′ 2″.

Main lounge of the "Wego", recently delivered to Mr. Powel Crosley, Jr., President of the Crosley Radio Corporation.

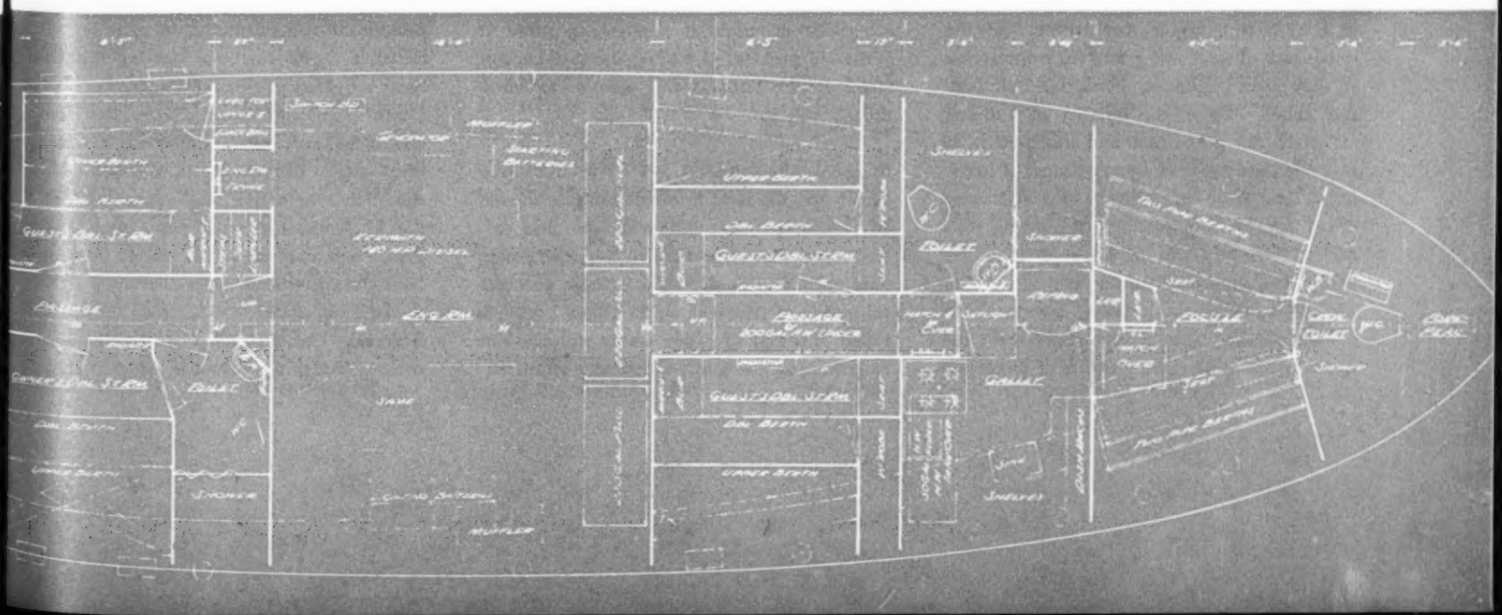
She is powered by two 160 hp. Kermath Diesels, driving twin propellers through Upton reverse and reduction gears. Each engine is fitted with the most recent type of MacLachlan under water exhaust system, which has a back pressure of only a quarter of a pound and completely eliminates all noise, carbon particles and exhaust fumes. In addition, the boat is completely fitted with Fiberglas insulation so that no noise, vibration or hull throb can be noticed by the owner or his guests. Even the draperies, shower curtains, and launch tarpaulin are of Fiberglas, the latter being the first of its kind ever made. This treatment provides many advantages worth noting. Fiberglas is fire proof and impervious to salt water corrosion and will last almost indefinitely. Because of its low heat capacity and high heat resistance, the lounge, staterooms, and pilot house of "Wego" will maintain comfortable temperatures regardless of either hot or cold weather conditions. Other equipment includes Exide marine type storage batteries, an automatic log which records both distance and speed, a 75 watt R.C.A. ship-to-shore telephone and complete fishing equipment. A glass bottom well is available for observing underwater activities and coral formations when cruising near shore.

Although she is unusually broad of beam and heavily built, "Wego's" Diesels provide a cruising speed of fourteen miles per hour with a cruising range of 750 miles. Electric auxiliaries are powered by a ¾ kw. Universal generator in addition to a 7½ kw. generator on each main engine. Bendix remote control from the bridge permits convenient one-man operation. The Diesels also supply hot water from their exhausts through a waste heat recovery system which acts in conjunction with the usual hot water heater. Another example of the many safety features is the photo electric pilot for automatic steering. This relieves drudgery at the wheel in fair weather and maintains an exact course through fog and rain.

Accommodations are clearly shown by the general arrangement plan and include three double guest staterooms in addition to the owner's quarters. As is customary, the crew quarters are located forward. The large galley connecting to the deckhouse dining saloon by a passage between the two forward guest staterooms is fitted with a gas range, electric refrigerator, and all other modern conveniences.

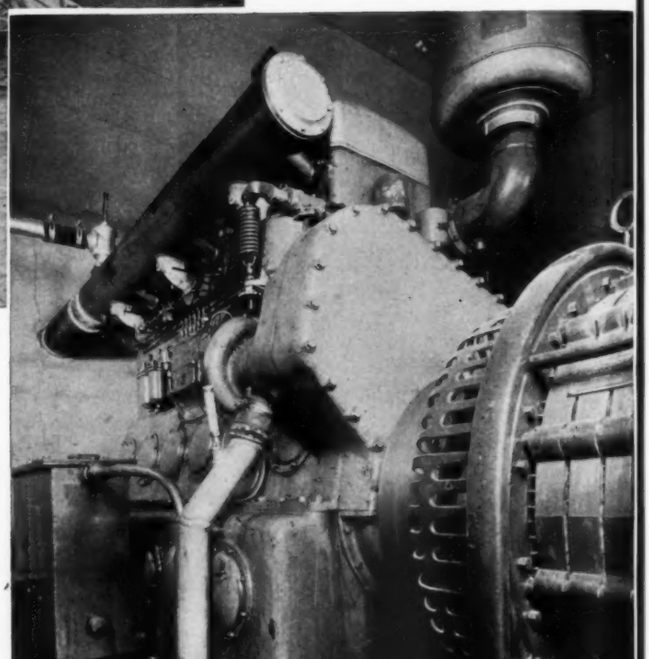
From this brief discussion, together with the photographs and drawing, it is evident that "Wego" strikes a new high in Diesel pleasure boat design.

Much credit is due the owner, naval architects, and builder for producing this unusual vessel which can properly be called the "biggest" small cruiser ever launched. Appointments throughout are also as modern as her dependable and economical Diesel engines, and with the many unusual features already enumerated, she represents the last word in cruising pleasure.



View showing conveyor, right, which brings the aggregate up from the crushers to the washer and grader, center. Stock piles of coarse and fine materials are seen on either side of the grader.

Closeup of the De La Vergne Diesel showing the Air-Maze intake filter, upper right, just below which are two Vortox breathers; Pickering governor; American Bosch injection pumps, and Purolator duplex fuel oil filter, all grouped on the side of the engine; and Briggs continuous lube oil clarifier, lower left.



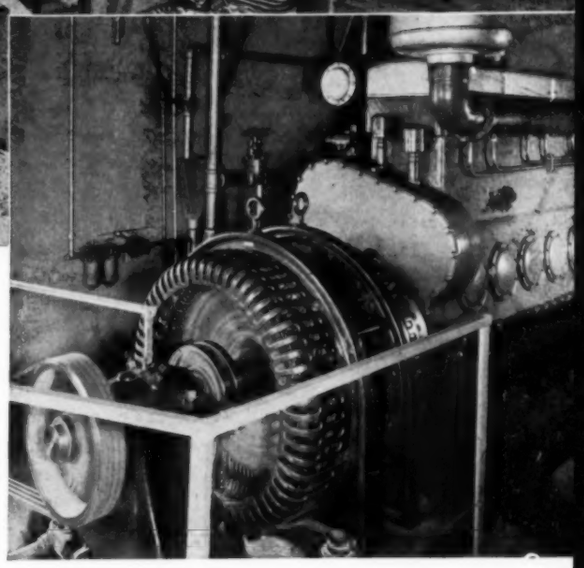
DIESEL CUTS COSTS ON SAND AND GRAVEL PRODUCTION

By WILBUR W. YOUNG

HERE is a highly competitive field—the production of sand and gravel for construction of our super highways, industrial buildings, and homes. These, the bulkiest of building materials, the production and distribution of which require heavy equipment, must of necessity be laid down at the job at ever decreasing prices in order to adjust overall building costs to the ever-rising cost of labor. Competitive production and distribution methods within the sand and gravel industry, together with market pressure, have thus imposed upon the operators the progressive problem of producing acceptable materials at diminishing costs. It is the old problem of finding the variable cost factor in the business and then doing something about it.

In similar circumstances, it has repeatedly been found that the only factor entering into overall production cost, that is variable and controllable within certain limits, is that of power. And until a more dependable, more economical source of power than the Diesel engine is found, this type of prime mover will continue to provide an eminently satisfactory solution to problems of this nature. In the plant here illustrated, a Diesel engine is proving this point. After ten years of successful operation, Burton Canfield, Inc., of Cedar Grove, New Jersey, was faced with such a problem a year ago when a Diesel generating set was installed. In this plant, there is a total connected load of 214 hp. consisting mainly of electric motors. Production amounts to 125 tons of material an hour graded into two types, that are designated as sand and gravel. Of the total output, 80% is gravel. The essential production equipment consists of a primary crusher, which is an Iowa

General view showing crushers, foreground; washer and grader, left background; and the boom of Caterpillar Diesel driven crane used for piling materials, right background.



Intake side of the Diesel, generator and exciter.

jaw type machine absorbing 50 hp.; a secondary crusher which is a Kennedy Van Saun gyratory machine, a series of belt conveyors and a washing and grading unit. This equipment as well as a Worthington centrifugal pump which supplies 2,400 gals. of water per minute to the washer, is driven by current from the Diesel generating unit.

The power unit is a six cylinder, 4 cycle, full Diesel, rated 260 hp. at 600 rpm. direct connected to a 440 volt alternator. A large, oil bath type, air cleaner is fitted to the engine intake to handle the excessive amount of dust thrown out by the nearby crushers. Due to the abrasive nature of the dust, this piece of equipment is highly essential to the most economical operation of the engine. Exhaust is led directly through the engine room wall to an outside silencer. Lube oil maintenance consists of continuous circulation through a duplex, self cleaning filter and a Fullers Earth block type clarifier. With this equipment, the lube oil was maintained in good condition for the first eight months of operation, then changed, and is now on an annual change schedule. The circulating pump is fitted to the engine. Fuel oil is filtered before entering the day tank and again before the injection pumps by duplex filters. A spring loaded centrifugal governor regulates the engine closely enough for satisfactory performance of an electric clock on the premises.

A never failing supply of clear brook water is available for processing the products and this water has been found to be satisfactory for both the closed jacket cooling system and the heat exchanger as well as the oil cooler raw water circuits. Jacket water is made up from brook water without treatment and cooling water is simply passed through the heat exchangers and discharged to the run-off.

While performing a vital function in the successful operation of this plant, it is seen that the Diesel generating unit requires a minimum of accessories, it is essentially equipped for long life and trouble free performance. The Diesel is a De La Vergne; the generator a Ridgeway; heat exchangers are Schutte & Koerting; duplex fuel and lube filters are all Purolator, and the Fullers Earth block type lube oil clarifier is a Briggs; the large oil bath air cleaner and silencer is Air-Maze and the exhaust silencer is Maxim; fuel injection is by American Bosch pumps and nozzles, and the engine governor is a Pickering of the centrifugal type.

TWO MODERN DIESEL TOWBOATS

By WILL H. FULLERTON

WITH the addition of the Diesel towboats, "Ernest T. Weir" and "Albert E. Heekin", to its fleet, the Campbell Transportation Company reaffirms its faith in the growing usefulness and importance of Inland waterways transportation. The Company also expresses its confidence in the new towboat designs that have been developed, largely through the research efforts of Dravo Corporation, in the past few years. As a result of up-to-date design, these compact towboats of smaller hull size and lesser engine capacity are made to produce the same amount of work as larger and more cumbersome craft of less advanced design and construction.

For instance, the "Ernest T. Weir" is powered with two 650 hp., eight cylinder Diesel engines and is, therefore, rated a 1300 hp. boat. Through the use of the Kort Nozzle, the tunnelled stern and modeled bow, however, its actual effective push is equal to that of a conventionally designed towboat of between 1800 and 2000 hp.

The "Albert E. Heekin" is a smaller boat but it possesses the same engineered efficiency as the "Weir" and while rated at 760 hp., it will do the work of a conventionally designed towboat of between 1000 and 1100 horsepower rating.

These two modern vessels will become the newest members of the fleet that Campbell Transportation Company operates between Pittsburgh and New Orleans. Both boats are particularly useful in the two-way movement of freight maintained by the Campbell Transportation Company between Pittsburgh and New Orleans. The boats will be at their best when handling upstream traffic, an advantage of particular importance, in view of the rapidly growing volume of upstream tonnage.

The normal load of the "Ernest T. Weir" will be in the neighborhood of 10,000 tons. With such a tow, the "Weir" will be in complete control, being able to stop, steer and flank at will. The maneuverability of the boat is assured by the use of six rudders—four ahead and two astern of the propellers. Separate steering gears and controls are provided for ahead and backward steering.

In appearance, the "Ernest T. Weir" is unusual among river towboats, because of its compactness as compared to the predecessor boats of equal pushing power. Its design is functional . . . no frills or extraneous adornments. There is a graceful sweep to the shear line, to which all doors and windows are lined up perpendicularly. Deckhouse fronts are appropriately rounded to complete the effect.

In the interior of the boat no expense has been spared to place the living accommodations on a par with the mechanical efficiency of the craft. The engine room has been effectively sound-proofed.

Living space in the form of state-rooms, lounges and mess rooms is well disposed and provided with the highest degree of ventilation, insulation and heat and light accessibility.

The hull and superstructure are of all welded steel construction. The hull is built on the transverse frame principle, divided into compartments by six watertight bulkheads. A non-watertight bulkhead forms the centerline for the full length of the ship. Fuel storage is provided in the form of six oil-tight compartments in the wings.

So far as her underwater arrangements are concerned, the "Albert E. Heekin" bears a striking resemblance to the "Ernest T. Weir", having similar predetermined hull lines from bow to tunnelled stern. Both vessels are twin screw Diesel propelled and are equipped with Kort Nozzles to increase their effective push and with six rudders—four ahead and two astern of the propellers to insure the high degree of maneuverability that is essential to boats engaged in river work.

Above the water line, however, a decided difference is noted in the general design. The "Albert E. Heekin" looks a great deal like a sea-going vessel, the main deck having been raised about three feet above the fender line.

This resulted in a high free board which makes the vessel more suitable for open water navigation than the conventional river towboat of limited freeboard would be. Like a sea-going vessel, the "Albert E. Heekin" has its crew's quarters, as well as the mess and galley, in the hold. This is a departure from usual river practice, made possible by the additional depth given the hull by the added free board mentioned above.

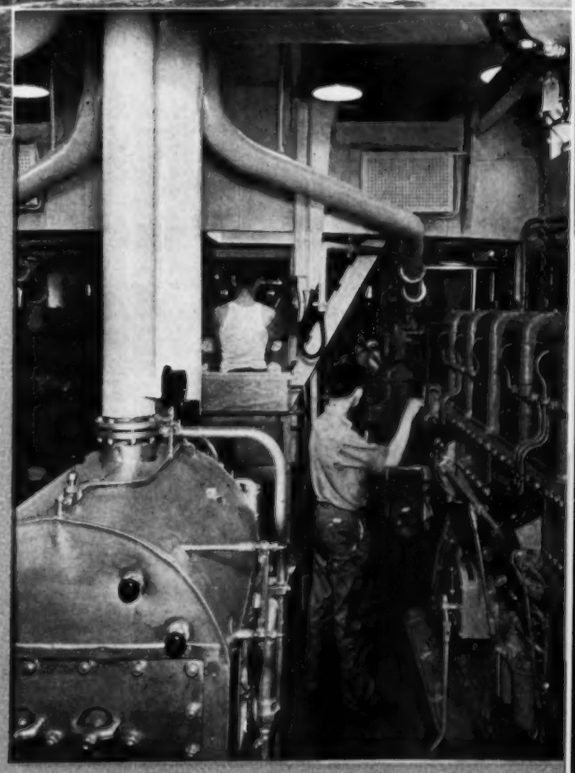
The "Albert E. Heekin" has unit heaters with blowers located in the mess room, engine room and lounges, forward and aft holds and pilot's house. The blowers of the unit heaters are used for ventilation if required during the summer months. In addition to this ventilating system, there are plenty of cowl ventilators and a forced exhaust from the galley.

In line with the thoroughly modern treatment of these towboats are the well arranged machinery spaces. On the "Ernest T. Weir" are a pair of Superior Diesel propulsion engines, each 8 cylinder, 14¼" bore, 20" stroke, rated 700 hp. at 277 rpm.; two Superior Diesel auxiliary engines, each 6 cylinder, 5½" bore, 7" stroke, rated 80 hp. at 900 rpm., driving 50 kw. Crocker Wheeler generators; two Ingersoll-Rand air compressors driven by Westinghouse, 30 hp. motors; two De Laval Unimatic centrifugal oil purifiers, one for fuel and one for lube; Griscom-Russell heat exchangers for cooling main and auxiliary Diesels and numerous pumps for the various sources.

The "Albert E. Heekin" is fitted with a pair of Cooper Bessemer propulsion Diesels, each 6 cylinder, 13" bore, 16" stroke, rated 380 hp. at 310 rpm.; one Superior auxiliary Diesel, 8 cylinder, 4½" bore, 5¾" stroke, rated 55 hp. at 900 rpm., driving a Crocker Wheeler 35 kw. generator and Watrous service pump; another auxiliary Diesel, same as above, driving a Gardner-Denver air compressor, two Briggs lube oil clarifiers; Maxim Diesel exhaust silencers; Korfund vibro dampener bases under the auxiliary units; Condenser Service heat exchanger for Diesel jacket cooling; Purolator raw water filter; and all necessary service pumps.

The Diesel towboat "Albert E. Heekin" on trial run. With quarters below decks, she represents a radical departure from river towboat design: better for open water navigation.

View of the "Heekin" engine room showing one of the Cooper-Bessemer 380 hp. propulsion Diesels.



View of the "Weir" upper engine room showing top enclosures of the Superior 700 hp. propulsion Diesels, switchboard and engineer's station.

The "Ernest T. Weir" on trial run.

GAS ENGINES SAVE $24,000 THE FIRST YEAR

By LELAND BRADNEY *and* R. E. BRAGSTAD

THE Sioux Falls Sewage Treatment Works treats the normal domestic from the City. The population of Sioux Falls is 41,000, 95% of which are connected to sanitary sewers. The Treatment Works also handles the waste from the John Morrell & Co., large packing plant.

When the solids are removed from the sewage and stored in closed tanks under proper conditions, digestion takes place which reduces the solids 40 to 50 percent, by weight, with the production of gas which has a heat value of from 550 to 725 Btu. per cubic foot. The analysis of the gas produced at the Sioux Falls Works is:

Methane	72.0	Percent
Carbon Dioxide	22.0	"
Nitrogen	4.5	"
Hydrogen	0.8	"

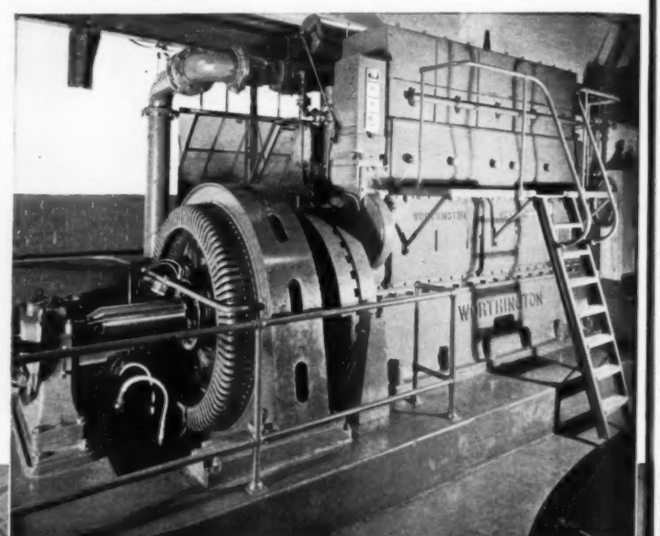
Hydrogen Sulphide 0.64 grains per cubic foot.

The average heat value of sewage gas can be taken as 600 Btu. per cubic foot. Such a gas will at once suggest itself as a source of heat or power. With the advent of heated sludge digestion tanks, this gas has been used to heat the tank which produces it, as well as the buildings around the plant. The optimum digester tank temperature is 90-95 degrees F. In general, the commercial type of gas fired hot water boiler has been used for this purpose and the hot water circulated through coil or heat exchangers inside the digestion tanks. In most cases, it has been from the surplus gas produced that Sewage Plant Managers look for some means of utilizing this valuable by-product. Gas, so far as the treatment of sewage or industrial wastes is concerned, is definitely a by-product as the digestion process is designed and used primarily for the reduction in quantity of sewage solids.

When considering the potential power possibilities, the gas engine appears to be the best since it has several desirable assets over other methods of power production; i.e. low initial cost, small amount of auxiliary equipment, and is available in wide range of power ratings.

Inasmuch as at this time there are over 130 cities in this country operating gas engines in their sewage treatment works, this wise choice is borne out. In the sewage treatment works the services for which the engine is operated fall into three classes: driving sewage pumps, in which case they are generally connected to the pump through increasing or step-up gears; driving generators, most engine generator sets are direct connected; and driving blowers.

Worthington gas engine and E.M. 230 kw. alternator in the Sioux Falls sewage treatment plant.



The three Worthington gas engines are seen in this view. The two engines at the left are direct connected to Roots-Connersville 5750 cfm. blowers. At the right is seen the operating end of the generating engine shown in top view. Note Manzel force feed lubricator on this unit. Also note Honan-Crane lube oil purifier, left: one of these units on each engine.

General view of the Sioux Falls sewage treatment plant.

In plants where separate sludge digestion is used, the answer to the power cost becomes at once apparent—install gas engines to drive the blowers. This is just what has been done in many instances. Furthermore, the use of direct connected blowers is more efficient, and, as the speed of the engine can be controlled over a wide range, this also, affords a convenient method of controlling the air to meet the changing condition of the waste being treated. It has been found that sufficient waste heat can be recovered from the engines to heat the digestion tanks and to care for heating the buildings. In most cases, the jacket water is used for heating digestors, which, of course, serves to cool the engines at the same time. In cases where the jacket water is not sufficient, waste heat boilers are installed. Because the exhaust temperatures run from 1000 to 1100 degrees F. on gas engines, considerable heat can be recovered in this manner.

Digester Gas has only one fault, which is that it contains hydrogen sulphide, which when oxided by combustion or other means produces sulphurous acid. This gas can be cheaply and effectively removed, and in most cases is removed in the same manner as it was removed from water gas; i.e. by passing the gas through an iron sponge.

The engine installation consists of two Worthington, 6 cylinder, 210 hp. at 600 rpm. gas engines, both of which are direct connected to Roots-Connersville blowers through Falk flexible couplings. Each blower is rated at 5750 cfm. of free air at 8 pounds gauge at rated engine speed of 600 rpm. The third engine is a Worthington, 5 cylinder, 335 hp. at 450 rpm. and is direct connected to an Electric Machinery Alternator rated at 230 kw. or 288 kva. with 80% power factor.

The generator furnishes all the power needed at the sewage plant for pumping, lighting, etc. The generator floats on the City's power lines, is operated at full load, the excess power being fed to the city lines. At the present time, the city takes about 40 percent of the generator's output. The City Light Plant furnishes standby service for the sewage plant, which assures a constant supply of power in case the generator is shut down.

The heat from the engine jacket water is transferred to the digester heating circuit through a Lumus inter-cooler, this being necessary as the pressure carried on the digester heating circuit is greater than engine jackets would be expected to carry. Over 5000 feet of 2½ inch steel pipe is utilized to heat the digestion tanks.

Inasmuch as the gas production varies during the day some means is usually provided for storing some gas. In this case a 36 foot diameter Hotonsphere, having a capacity of 50,000 cubic feet at 30 pounds pressure, was installed.

The average daily gas production is 350,000 cubic feet of which the engines at full load consume 270,000 cubic feet.

The engines are equipped with Nugent oil filters and Honan-Crane oil purifiers. The Honan-Crane purifiers have been found to be very effective, the oil remaining clear with no increase in the acid content. The engines are also equipped with alarm and shut-down devices which function in case of low water or oil pressure and high water or oil temperature. These devices close the gas valve, and devices for grounding the magneto in case of over-speeding of the engine or in case of power failure are also provided.

Prior to the installation of the engines, motor driven blowers were used. The old units were 2100 cfm. at 8 pounds gauge and driven by 100 hp. motors. The engine installation occupied the same building that housed the old units. The last year that the old units were in use, the power cost was $28,000. The engines are now nearing their first year of service and the operating cost, including interest on investment and depreciation, will be less than $4,000, at a saving in the first year of $24,000. At this rate, the saving will more than pay for the entire installation in less than three years, leaving little doubt that gas engines in a sewage plant are a good investment. Consulting Engineers were Greeley & Hansen, Chicago, Illinois.

COOPER-BESSEMER POWERS TRIPLETS

By WARREN GLEASON

THE designing and building of any eighty-five foot Diesel-engined tug frequently attracts attention in maritime circles, but when one concern places orders for three such vessels the affair becomes news.

Such a program has been undertaken by the River Terminals Corporation, with administrative offices in New Orleans, and branch offices in Houston, Texas, Camden and Little Rock, Arkansas, and Monroe, Louisiana. The business of the corporation is the transportation of oil and general cargo between Houston, New Orleans, and ports along the Mississippi, Red and Ouachita Rivers. 30 all-steel barges are owned and operated by the corporation, 16 of these being tanks and the other 14 for general cargo with an average capacity of 1,000 tons. With the three new additions to the fleet, a total of eight tugs will be owned and operated by this company.

All three new tugs are identical and all built by the Levingston Shipbuilding Company of Orange, Texas. Two of these, the "Uncas" and the "Jack Ruff", have already been delivered and are in service; the third is expected to be ready for use in August.

Dimensions for these splendid River Terminals tugs are 85′ overall length, 23′ beam, with a depth of hold of 10′ 5″. Draft is 7′ 6″ mean, with 6′ 6″ forward and a maximum aft of 8′ 6″. As service will be largely in the Intracoastal Canal where scant depth of water prevails, the hulls have been designed to incorporate the Kort Nozzle, the better to supply the 69″ propellors with a constant volume of water.

For propelling power, the tugs are powered with Cooper-Bessemer Diesels, air-starting and direct reversing, 8 cylinder 13″ by 16″, developing 600 hp. at 375 rpm. and 730 hp. at 400 rpm. Sale, supervision of installation of engines and auxiliaries, and testing was handled by Calmes Engineering Company of New Orleans, Cooper-Bessemer distributors for the New Orleans area.

Engine rooms are surprisingly spacious, considering the size of the main engines and the considerable auxiliary equipment. One feature in particular which will interest the practical tugboat engineer is the complete work-bench fitted on the starboard side of each engine-room. The bench is of steel, integrally built with the hull, and is amply fitted with sizeable drawers for tools; equipment consists of a drill-press, grinder, vise and a small but serviceable motor-driven lathe.

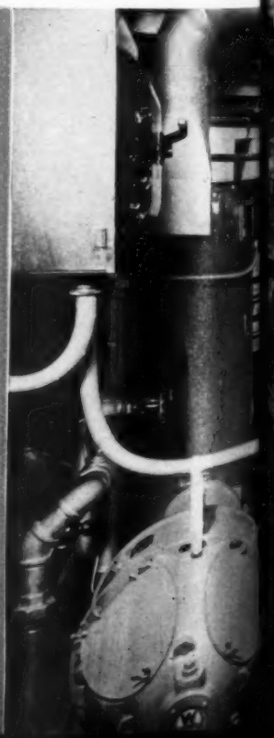
Adequate compressed air is supplied by a Gardner-Denver 2-stage compressor of 40 cf. capacity, water-cooled and powered by a Westinghouse 10 hp. electric motor; starting and stopping of the compressor is automatic, according to the pressure in the air-tanks. A further air-supply is ensured by the mounting on the main engine of a 23 cfm. Quincy compressor, which is driven off the same shaft used for turning the lube oil pump; a Twin-Disc clutch completes the connection.

Lube oil also receives double attention; besides the Cuno Auto-Clean filters, each engine room includes a thermostatically controlled Honan-Crane lube-oil refiner. The pyrometer system is Wheelco, with thermocouples for each cylinder and a selective gauge at the engineer's station. Lube oil coolers are Harrison, with Young Radiator heat exchangers; sight-flow indicators are fitted in the cooling water piping systems. The mechanical lubricator for the Guthans stern bearing gland is driven by a Velos belt drive from a reduction gear off the rear of the main drive shaft.

Auxiliary power is likewise full Diesel, two 3-cylinder 30 hp. at 1200 rpm. Lister Diesels being installed in each of the three new tugs. The Lister engines are direct connected to 20 kw. Westinghouse generators; starting of these auxiliaries is electric, through special starting windings built into the generators. In most tugs of similar capacity, one Diesel-generator would probably be sufficient, assisted perhaps by another generator driven by the main engine. In a tug used principally for canal-towing, however, the propelling engine rpm is frequently too slow for generating service; for this reason dual generating installations are here employed.

Both auxiliary Diesels are mounted on a common sub-base fitted with Korfund vibration

Below: Close-up of one of the three new tugs Cooper-Bessemer powered, delivered to the River Terminals Corporation by the Levingston Shipbuilding Company. Center: Engine room which typifies these three new river tugs with the 8 cylinder, Cooper-Bessemer Diesel in the foreground and efficient work bench on the starboard side. Right: The two Lister auxiliary generating units as installed on all three tugs.



dampeners. In operation, the generators cannot be paralleled, but both sets can be put on the board simultaneously. Each Lister has its own fresh water cooling system and Young Radiator heat exchanger, independent of the exchanger for the propulsion Diesel. Switchboards are dead-front type Westinghouse, made to the design of the Levingston Shipbuilding Company. Voltage regulators for the lighting systems are Safety Car and Heating Company products; reverse current relays are Hartman; each generating unit has its own voltmeter and ammeter.

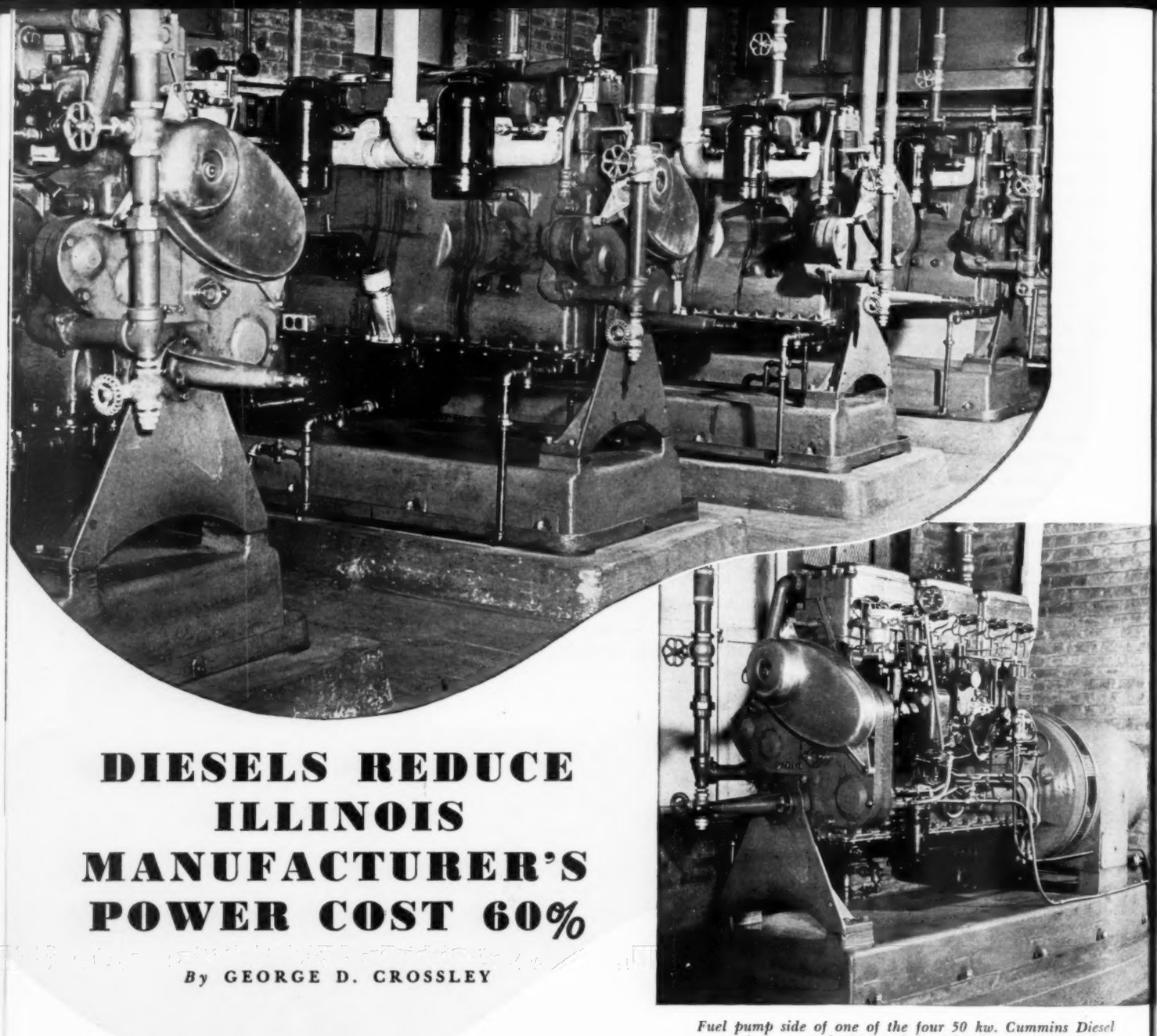
In other departments of the tugs, design and equipment and workmanship keeps well in step with the excellence of the power installations. Worthy of particular notice are the galleys. Mess table tops are rimmed with stainless steel, the tops of special fireproof material not to be marred by cigarette stubs. Seats are integral and adjustable. Galley floors are of non-skid carborundum tile. The ice boxes are resplendent, stainless steel inside and out, electrically refrigerated and fitted with separate coils with outside faucets for drinking water. Galley ranges are Webb perfection, oil-burning. Steering is by compressed air, using the Bollinger system made by the Barker Barge Lines of Lockport, Louisiana. The tugs can be steered not only from the pilot house but also from the aft end of the upper deck; here an additional steering wheel is installed with engine-room signals as well; controls for floodlights for night operation are fitted here. Details like these are the neat and efficient little touches which are brought about only by long experience in practical operation. Pilot houses are equipped with controls for running lights and fire extinguisher systems and search-lights. 75 watt RCA radiophones are installed.

As to working efficiency of the new tugs, the "Uncas" makes six miles an hour towing two empty barges. A hundred miles is covered in a day's run, towing three barges loaded with about 2500 tons of cargo. Round trips are made between New Orleans and Houston in eight to nine days. Results of this sort show excellent coordination of design, power and operation.

Other auxiliary equipment of the tugs include Rumsey and Viking bilge pumps; Dayton-Dowd fire pumps, driven by Westinghouse motors, supplying 100 gpm. at a 270′ head; Detroit pressure switches for lube oil alarm; Penflex air-insulated exhaust tubing; Weston tachometers; U. S. Gauges for lube, fuel and air; Purolator fuel filter; 6 30″ by 96″ air tanks, each with an Ashcroft-American gauge; Burks water systems for drinking and sanitation waters; York automatic oil-burning heaters for supplying hot water to radiators throughout the cabins; Kelvinator electric refrigerating unit; CO_2 fire extinguisher system; Russel-Stoll running light controls; AE Co. electric capstans with 7½ hp. Diehl dc motors on after decks.

The tugs are built to full American Bureau of Shipping requirements, certificated for lake, bar, sound and short coastwise operations.

Well designed roomy galley on the Diesel tug "Jack Ruff."



DIESELS REDUCE ILLINOIS MANUFACTURER'S POWER COST 60%

By GEORGE D. CROSSLEY

Fuel pump side of one of the four 50 kw. Cummins Diesel generating sets at the Makomb Steel Products Company, Macomb, Illinois. Note Nugent filter and Woodward governor.

MACOMB, Illinois, can boast one of the country's most outstanding applications of Diesels in an industrial plant. Here, the Makomb Steel Products Company, a unit of the Globe American Corporation, operates four 50 kw. Diesel generators which have proved highly successful during the last year and a half.

The company manufactures some 400 different items and has one of the largest plants of its kind in the central states. Included among their products are electric clocks, food mixers, air heaters and an extensive line of well-known poultry equipment. As a matter of fact, they are said to be the world's largest brooder manufacturers, employing some 500 men.

Prior to the installation of Diesel engines, the company operated from the local power line and was confronted with a not unusual problem of excessive cost. This was due mainly to a highly seasonal operation and widely swinging power demands.

Under these conditions, the installation of four separate 50 kw. Cummins Diesel generating sets provides the maximum flexibility in the power output. Four units permit the company to match power output with the power need . . . to operate one unit for light loads at night, one or two during the relatively slack summer season and the 24-hour operation of three to four during the busy winter season.

A 20 ft. by 50 ft. power room was added to the company's buildings just before the engines were put in. Although one could never tell it, the addition was built entirely of scrap, old steel beams, discarded brick, etc. Inside, nothing has been spared to make the power plant as modern and as efficient as possible. In so doing, some novel and practical ideas were developed. One example . . . heat from the cooling radiators is reclaimed for warming an adjacent section of the buildings.

An example of the savings now being experienced was given during one month of the company's winter operations soon after the Diesels had been installed. Savings over the cost of

power from the utility line in a single month were estimated at some $875.

The plant's entire load was assumed by the four Diesel generators in December, 1939. Maximum demand has increased considerably since then and now hits 200 kw. peaks. As much as 3110 kwh. has been generated in a day. Through the month of December, 1940, a daily average of 2615 kwh. was generated while the entire winter season, a period of 102 days, demanded an average generation of 2293.8 kwh. per day.

In the nine months period, from August, 1940, to April, 1941, a total of $418,090 kwh. was generated for a fuel and lubricating oil cost of $2.875.51. This shows an average fuel and lube oil cost of only .00687 per kwh. During this same period, the average cost of maintenance materials and supplies which include such items as filter bags, Hilliard oil reclaimer, and engine parts was only .00215 per kwh.

A daily report is made on the operation of the units, giving an accurate record of the fuel and lubrication oil consumption and the kwh. production. It has been found, that during the heavier months of production, those from fall to spring, the fuel and lubricating oil cost per kwh. varies from $.0064 to $.0071. Diesel fuel costs the company $.058 per gallon and lubricating oil $.44 per gallon.

The kwh. produced by the Diesels starts climbing from an approximate total of 23,000 in the early fall months, up to a peak of 66,000 kwh. in December. The decline in the spring is less sharp and in April of 1941, some 47,500 kwh. was demanded. The summer months are low at times dropping to only a 15 kw. demand.

Under such fluctuating operation, the cost of utility power over a year was made very high. With a demand charge of $2.00 for the first 50 kw. and $1.75 per kw. for the remainder plus an energy charge ranging from $.035 per kwh. to $.009 per kwh., the average cost of purchased power was always in the vicinity of $.023 per kwh. In one month, a total use of 33,750 kwh. cost $774.78. Another month's consumption of 36,060 kwh. cost was $803.89. These figures, by the way, demonstrate how much the demand has increased since the installation of the Diesels, averaging approximately 33%.

The installation of the engines and related equipment is most interesting. A railroad siding at the end of the plant opposite the power room permits a tank car of fuel to be brought to the plant. The fuel from the tank is pumped through a 1¼" pipe line, 475 feet long, to the main storage tank by means of a small 1/3 hp. vane type pump. In 10½ hours, 6000 gallons of fuel can be transferred.

The fuel storage tank, having an 8,000 gallon capacity, is buried just outside the power room. This was set in at an angle so that water and other impurities can settle at the low end and be removed through an opening at the top.

Fuel is brought from the storage tank to a pair of 150-gallon day tanks, a distance of 16 feet and is filtered enroute by a Nugent Filter unit, size 1R. A second 1/3 hp. vane type pump is used for this transfer. The day tanks are installed some 8 feet higher than the floor which permits a gravity feed to the engines.

The four 50 kw. generating sets are lined up along one wall. Engines and generators are solid coupled and operate at 1200 rpm. Each unit is mounted on a common steel sub-base, which, in turn, is set on a concrete block projecting above the concrete floor some 4 inches. The concrete bases are 8 feet long, 40 in. wide, and 2 feet deep.

The engines, built by Cummins Engine Company, are the widely used Model H, having 6 cylinders, 4⅞ inch bore by 6 inch stroke and 672 cu. in. displacement. They operate at 1200 rpm. Each is equipped with Fulton Sylphon Safety controls, an adjustable speed control, Woodward Hydraulic Governor, and a pair of Donaldson Air Cleaners. The generators were built by General Electric and are rated at 50 kw., 62.5 kva., 3 phase, 240 volts.

The arrangement for cooling is most interesting. The radiators for each engine, originally a part of the unit, were moved to the adjacent plant maintenance department. Each radiator is installed in a wood duct about 5 ft. square and 12 ft. long, having vanes at either end. The ducts, located at the ceiling of the 70 ft. by 25 ft. room, are some 50 ft. from the engine room. By controlling the angle of the vanes at either end of the duct, both the amount of air admitted and the direction of its exhaust, i.e., whether into the room or outside, can be controlled. The fans are powered with individual 2 hp. motors. A constant check on their operation is permitted from the engine room by Cutler Hammer Motor Controls and Bulldog Vacu Break Switches which are wired into each fan circuit. Three small red lights under each pair of controls indicate whether or not the fan is running. Engine cooling water is circulated through the radiators with the standard engine water pump. The expected need of auxiliary water pumps was found unnecessary.

Each engine exhausts up from the center section of the manifold, through 3 inch pipe. These lead to individual Burgess Snubbers which are mounted vertically on the roof of the power room. Switchboard equipment supplied by the Ideal Switchgear Company is made up of four identical panels, one for each engine. Each mounts an AC ammeter, AC voltmeter, kilowatt-meter, hour counter, duplex controlled field and exciter rheostats, amperage phase switch, synchroscope control, DC exciter switch, main disconnect switch, and five jacks which are used in calibrating the meters.

In addition to the above equipment, the third panel also mounts a Duncan Watthour meter. Swinging panels on the left side of the board mount a Synchroscope and three Type F1 Simplex Voltage Regulators, mounted one above the other. On the right side of the board, other swinging panels mount a power factor meter, a frequency meter, an overload alarm which has not rung to date and a peak load control indicating the total kw. for the board.

Lubricating oil is changed on an average of but once a month. Oil additions per engine per month run in the vicinity of 7 gallons. This extremely low total oil consumption, less than half that ordinarily needed, is made possible by a Model B1, Type 50, Hilco Oil Reclaimer which operates 24 hours per day. This unit is set up in the middle of the four Diesels. Lines from each Diesel's crankcase lead to it under the floor and petcocks in each line located at the engine, control the oil flow to the unit.

. . . . . *And now please turn to page 69*

The Ideal switchboard which handles the output of the four 50 kw. Cummins Diesel generating sets.

GAS ENGINES IN THE SUGAR BOWL

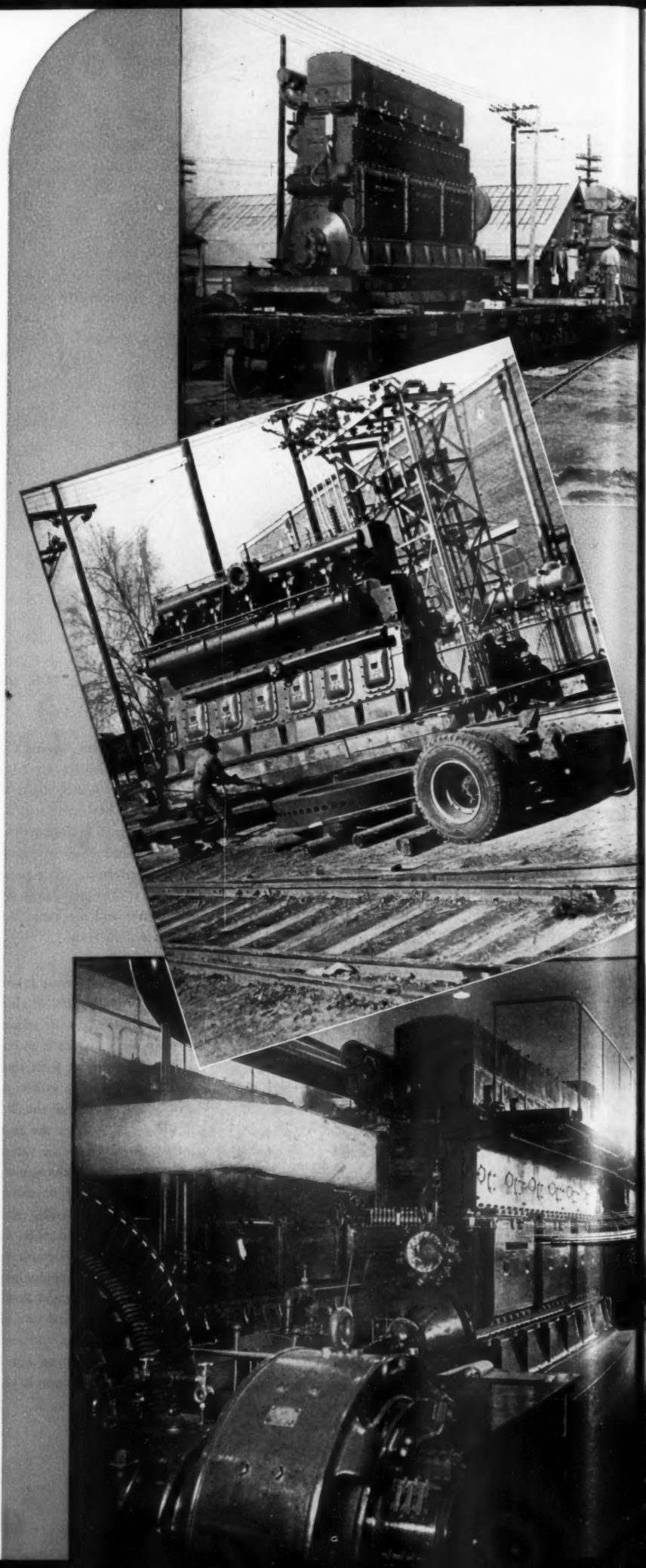
By WARREN GLEASON

ORDINARILY, any of the "largest in the world" records applying to mechanical affairs are expected to be encountered in the larger and more important industrial centers of the country; huge machines are the natural corollary of immense manufacturing enterprises, but are somewhat of a surprise in a land more renowned for historical interest, for romance, for fields of sugar cane instead of smokestacks.

New Iberia, Louisiana, on the placid Bayou Teche, is in the heart of the Sugar Bowl section of Louisiana, in the fertile country populated by the Acadians of Longfellow's epic of Evangeline. It is a rich country, kind to its dwellers. Not only is the soil and climate ideal for the countless acres of sugar cane and other agricultural products, but beneath the soil is wealth of another kind—oil. And where there is oil there is generally gas.

For many years the power plant of the General Public Utilities Company, the New Iberia subsidiary of Gulf Public Service Company of Louisiana, had been well served by its full-Diesels for generating power. Not only does this company supply New Iberia and vicinity with electric current, but also provides the water service, a feature of this latter being to furnish water for fire department use through Allis-Chalmers powered Dayton-Dowd 6″ centrifugal pumps of 1000 gpm. capacity at a 231′ head without either reservoirs or standpipes.

In search for even cheaper power than supplied by Diesel fuel, Mr. L. L. Ferree, General Manager, turned to natural gas fuel. In 1940, in June, the original installation was made, 2850 hp. This power is in twin units, each unit being a pair of six-cylinder Worthington engines in line, with a generator between the engines and direct-connected. Cylinders are 16″ by 20″, each 6-cylinder engine developing 712½ hp. at 327 rpm. The engines are the standard Worthington Diesel primarily, size EE, manu-



factured by the Worthington Pump and Machinery Corporation of Buffalo, and are converted by the manufacturer for use of natural gas as fuel. Should the user wish to operate the engines on straight Diesel fuel oil, they could be re-converted to this type of fuel with little difficulty.

Operation of the engines is interesting and simple in the extreme. Natural gas, bought from the United Gas Corporation, is piped to the plant and a volume-and-pressure meter is installed for each 1425 hp. unit. From the meter the gas passes through a regulator, thence to a mixing valve where it is mixed with air, and from there direct to the intake manifold and intake valve. The engine uses only two valves per cylinder, one intake and one exhaust. There is no carbureter, the mixing valve performing this function. Ignition is not by heat of compression, but by an ignition system similar to that of any automobile motor: Battery, distributor, induction coil and spark plug. The battery is 24 v., and an individual induction coil is used for each cylinder. Starting is by compressed air.

Lubricating oil undergoes periodical reclamation through a Youngstown Miller unit. No complete oil changes are ever necessary, fresh oil being added from time to time to maintain proper level. According to Mr. G. M. Gerlach, General Superintendent, lube dilution with natural gas as fuel appears to be less than when oil-fuel is used and the engines are unquestionably delivering their rated power. During the year of operation, careful watch has been kept; no breakdowns have occurred nor shut-downs for repairs; the only matter approaching a repair or overhaul being a thorough inspection to determine the exact condition of the engines. Operation of the engines averages 18 hours per day for each unit; every day in the week. Fuel consumption runs from 15,000,000 to 20,000,000 cubic feet per month for the entire installation.

No detailed operating costs are available at this time, Mr. L. L. Ferree stating that as the engines have been in operation only for one year he does not feel that a statement would be sufficiently representative to be of much benefit; too, cost of natural gas varies greatly in different localities and consequently each locality must determine for itself from local conditions as to the advisability of gas as fuel. However, as to the firm's satisfaction with this fuel and this engine, it is significant that the installation of a third unit, exactly similar to the two which have been tested for a year in actual service, is now being made. This fact speaks for itself so strongly that it is not even necessary to read between the lines. Where natural gas is available at a cheap rate, it is a satisfactory fuel for an engine of the heavy Diesel type according to results obtained in New Iberia.

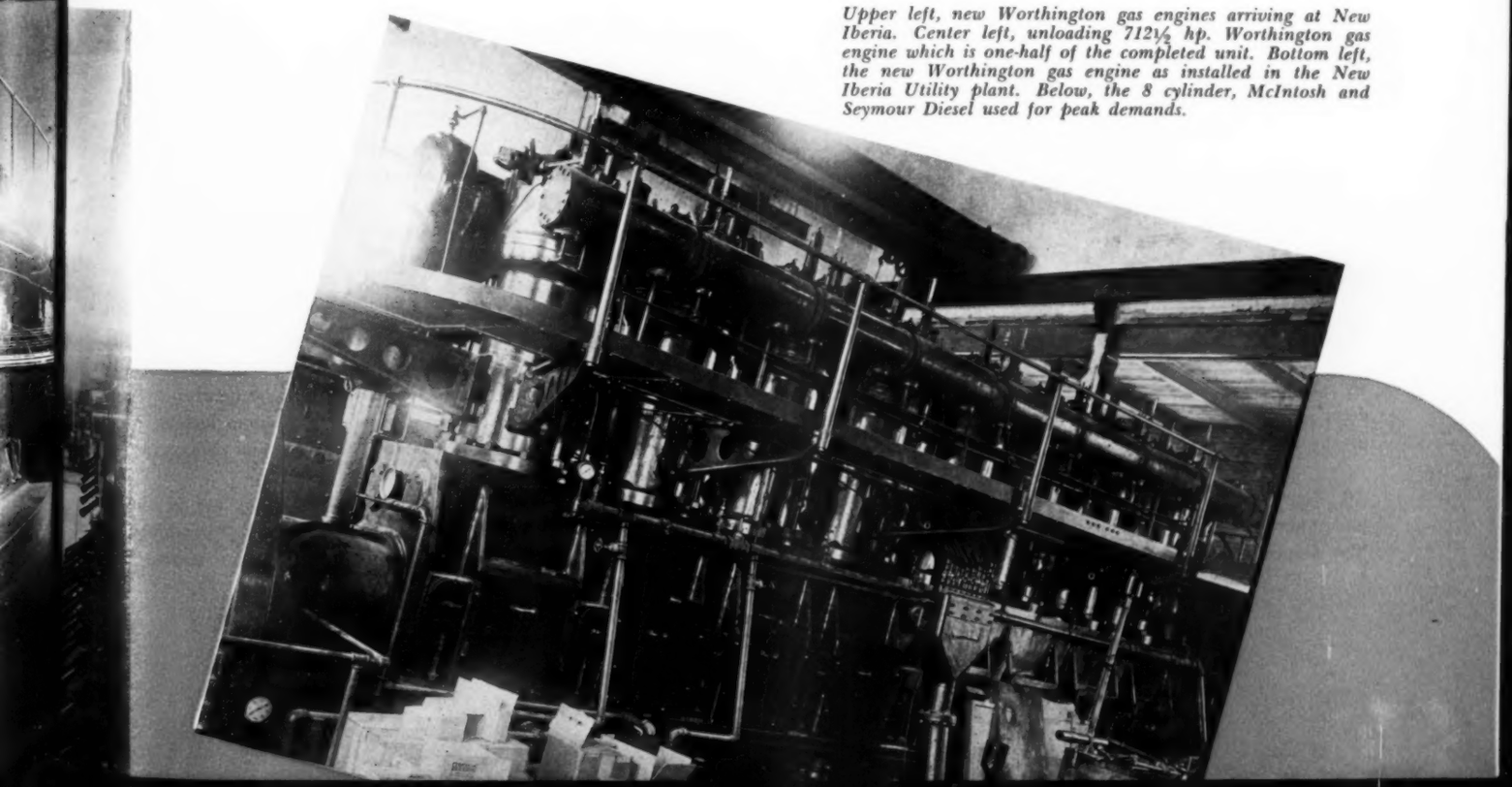
The generators driven by each pair of 712½ hp. Worthingtons are Westinghouse, AC., 1250 kva., 2400 v. and 300 amps.; 3-phase, 60-cycle. Cooling for the engines is closed-circuit, using Schubert-Christy heat exchangers with cooling tower; the plant has its own deep well for water supply. "Ursa" lube oil is used, the engines being additionally fitted with Manzel lubricators for cylinder and top lubrication.

For peak pick-ups, the plant depends on Diesels already installed. There are three of these, all McIntosh and Seymour with air fuel-injection. Two of these are 4-cylinder, 16½" by 24", of 400 hp. at 200 rpm., each turning 344 kva. generators; both these Diesels were installed in 1924. The third, installed in 1928, is an 8-cylinder 17" x 24", 800 hp. at 200 rpm. with a 675 kva generator. One or two of these Diesels are in daily use according to load demands; it is seldom necessary to use all three in addition to the gas-engines. Previous to the gas-engine installation, the plant was also equipped with a horizontal-type two-cylinder 250 hp. Snow Diesel.

The gas-engines at New Iberia, according to the management, are the second-largest installation of this type of power in the world. Oddly enough, the largest in the world is in another small Louisiana city not so far from New Iberia.

Total horsepower of this modern plant will be 5,875; 4,275 in gas-engines and 1600 in full-Diesel. Annual kwh. output, approx. 10,000,000.

Partial equipment list: Youngstown-Miller lube oil reclaimer; Ingersoll-Rand air compressor; American air-filter; Alnor pyrometer system; Burgess exhaust snubbers; Ingersoll-Rand cooling water pumps; Jenkins and Lunkenheimer valves in water lines.



Upper left, new Worthington gas engines arriving at New Iberia. Center left, unloading 712½ hp. Worthington gas engine which is one-half of the completed unit. Bottom left, the new Worthington gas engine as installed in the New Iberia Utility plant. Below, the 8 cylinder, McIntosh and Seymour Diesel used for peak demands.

TUNA CLIPPER

"ST. GEORGE"

ST. GEORGE, new Southern California tuna clipper built for Mike Balestreri & Sons and the Van Camp Sea Food Co., by Harbor Boat Building Co., Terminal Island, has gone into fishing service in Central American waters, out of San Diego.

Mainly due to enlarged refrigeration systems, *St. George* represents a large investment. She has a 102 ft. length, a beam of 25 ft., and a depth of 12 ft. Sawn frames are 6" double, approximately 18" on center. Stern is the familiar fantail, practically square across to permit the use of additional chain-hung fishing "racks," or platforms. The raised forward deck extends aft to the great bait tanks, but there is no third deck, as customary, and where vessel control usually centers.

All Diesel engines, generators, motors and pumps were supplied by Fairbanks, Morse & Co. The clipper is said to have required more machinery than any similar vessel of her size yet commissioned. The main engine is a 300 hp. two-cycle, pump scavenging Diesel, direct reversing. Its operation, optional from engine room or pilot house, is by hydraulic control in the latter case, the first time this system has been used in hook-and-line tuna clippers. Steering of the vessel is also hydraulic, the installation made by Atlas Hydro Control Corp.

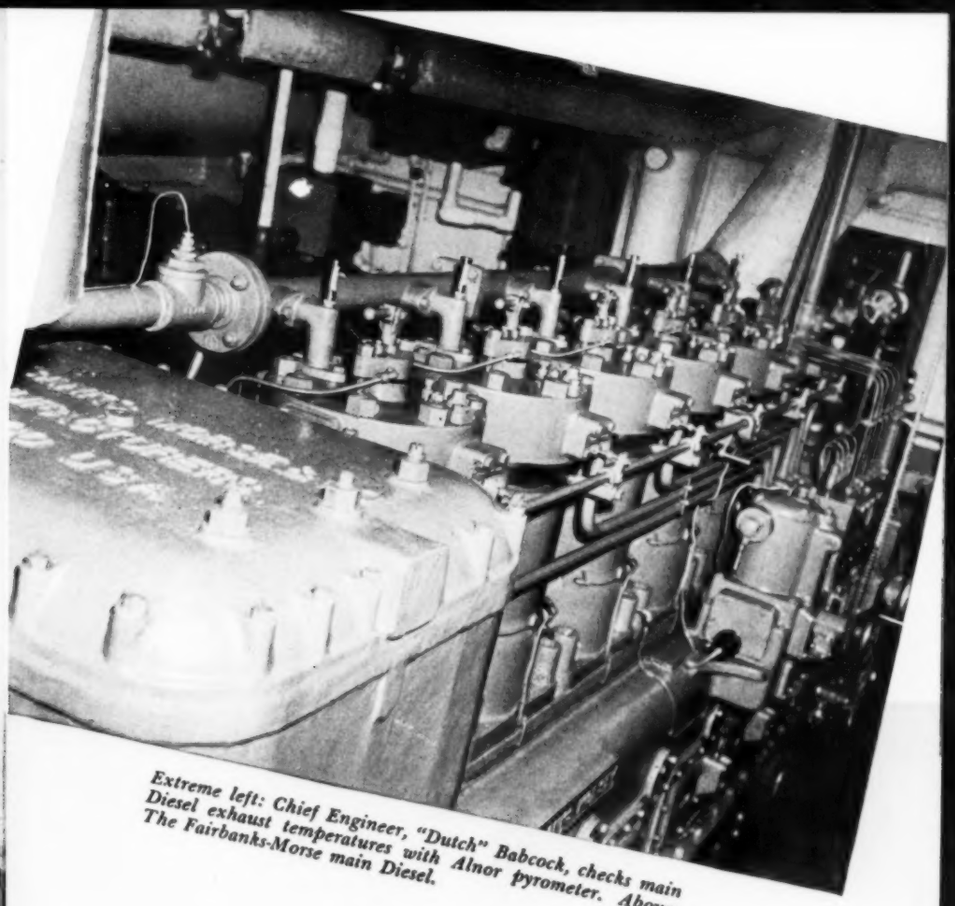
The three additional Diesels required for operation of auxiliary machinery, like the main engine are also of F-M make. Two of these are bolted to timbers on either side of the main engine, 120 hp. 4 cycle, 8 cylinder plants direct-connected to 80 kw. generators. The standby is located in the upper engine room and is a 40 hp. 4 cylinder, 20 kw. generating set.

The two large auxiliaries are for operation of bait pumps and the complicated, three-phase refrigeration system with its multiple pumps and compressors. The third supplies power for the galley refrigerator, bilge pumps, lights, wireless, and other electrical equipment. All Diesels are fresh-water cooled, heat exchangers supplied by Schutte Koerting.

To keep alive a fair-sized school of bait fish in deck tanks and wells below, there are two 10" F.M. vertical-type pumps, driven by 15 hp. motors mounted on top. These huge pumps are installed in the main engine room.

Gay Engineering Co. fitted the clipper with her "dry" refrigeration plant which, it is estimated, will permit the preservation at between 10 and 15 degrees above zero, of between 150 and 160 tons of tuna, a tremendous increase in potential pay load over previous clippers of this size.

Three Vilter compressors are in the upper engine room, 5½" by 5½" machines, driven by 25 hp. motors. Direct current is used



Extreme left: Chief Engineer, "Dutch" Babcock, checks main Diesel exhaust temperatures with Alnor pyrometer. Above: The Fairbanks-Morse main Diesel.

By A. W. PONSFORD

throughout. In addition, there is a smaller ice machine for galley use, this driven by two 2 hp. motors. The system employed is known as a fast-brine freezing, no-slush method whereby, by successive steps, blood heat is extracted by sea-water cooling to about 30 degrees F., then heavy brine freezing to between 10 and 15 degrees above zero, after which the solution is pumped off and the fare held dry by use of ammonia coil banks within the wells.

There are eight wells in all, of varying size, but with a general holding average of twenty tons. The system employs 10 1½ hp. close-coupled pre-cooling pumps, and two 7½ hp. vertical pumps similarly hooked. Most of the control, through more than 200 valves centers along the narrow shaft alley and where individual temperature readings are also available.

On the *St. George* the refrigerating engineers provided a separate coil bank in one of the main-deck tanks, using this as a brine storage well in which the dense brine is made and held for convenient piping to wherever needed. Flexibility of operation, achieving a high capacity chilling output has been secured by combining the coil and central piping system. During freezing operations, the whole system of well coils, brine tank coils, individual and main brine pumps coordinate as a unit.

Tuna clipper engineers, because of the manifold operations they must constantly watch, are among the most harassed of men. Alnor pyrometers on 24 cylinders of the four Diesel engines relieve "Dutch" Babcock, the *St. George's* chief engineer of one worry. Four-six- and eight-place dials for instant recording of exhaust temperatures are conveniently placed, each Diesel being individually serviced.

Both engineer and captain have an additional aid in mechanical operation of the clipper in the Weston tachometer installation. Dials are located both in the engine room and pilot house, giving both forward and reverse revolutions of the main engine, an important help when maneuvering in close quarters. The clipper is also equipped with a Fathometer and commercial wireless set of world range.

Accommodations for a crew of fourteen men are located in staterooms on the main deck forward of the engine room. The captain's cabin, chartroom, and wireless are on the secondary deck. The spacious galley, on the main deck amidships, has a tiled sink, its own electric refrigerator, built-in fixtures and an Ingle oil-burning galley range.

Carrying more than 20,000 gals. of Diesel fuel and adequate lubrication and fresh water supplies, the clipper has a cruising range of about 6,000 miles, sufficient for a voyage to the far-southern Galapagos Islands banks, off Ecuador.

INDUSTRIAL TRACTOR

By DWIGHT ROBISON

This unit hauls a 13-ton pay load at 18 mph.

H. S. Eberhard, Caterpillar's Chief Engineer, at the controls, and his assistant, C. A. Gustafson, check over the new Diesel tractor and bottom dump wagon.

A RUBBER-TIRED industrial tractor, powered by a 90 hp. Diesel engine and capable of hauling more than thirteen tons of earth at 18 miles an hour and an 11 cubic yard heaped measure, bottom dump, pneumatic-tired wagon were recently put into production by Caterpillar Tractor Company.

The DW-10 tractor has been introduced after more than three years of intensive development work and field tests. It is built specifically for use on roadbuilding, construction and national defense projects, where speed, long hauls, and other physical conditions are favorable to the use of rubber tires.

Powered by the Caterpillar Diesel six-cylinder, water-cooled automotive engine, the tractor weighs 14,500 pounds, and has a tractive effort of 13,000 pounds in low gear, with a loaded wagon or scraper. A quick acting, vertical type governor gives fast pickup to get the loaded tractor and wagon to full speed almost immediately. The transmission is the constant mesh type, and has five forward speeds, ranging from 2.4 to 18 mph.; and one reverse speed of 3 mph.

The tractor has a "high traction" differential, which gives increased pulling ability under unfavorable ground conditions, plus longer tire and engine life. Engineered for heavy duty hauling service, the differential applies greatly increased torque to either driving wheel, should the opposite wheel start slipping. In addition to increased pulling power, this increase in torque lessens tire slippage, as well as keeping a more even load on the engine.

The braking system consists of foot pedal operated, independent, hydraulic brakes for each rear wheel of the tractor, which permit the operator to turn the unit short on restricted roadways. The non-stop turning radius of the tractor and wagon is only 20 feet. A lever operated vacuum booster acts on both the tractor brakes and the hydraulic brakes on the rear wagon wheels for stopping the unit. A mechanical parking brake is also provided.

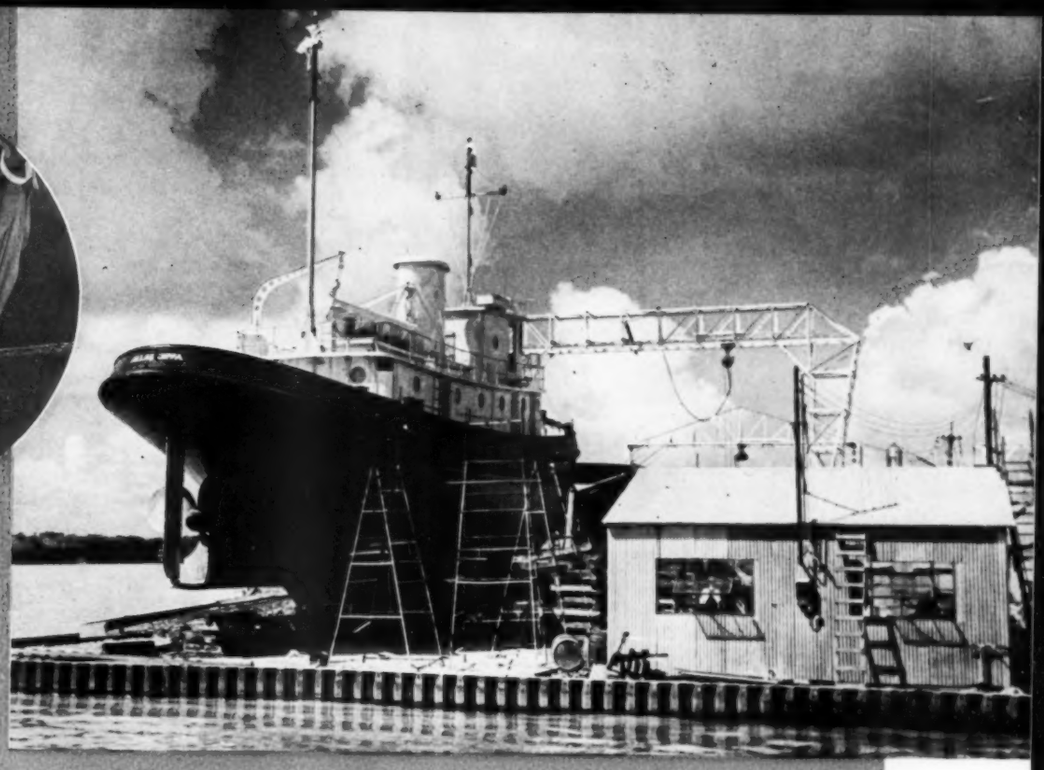
The tractor is designed to produce a maximum of work with a minimum of discomfort and fatigue to the operator. There is a full floating seat assembly mounted on a spring, which is adjustable to compensate for varying weights of operators. A snubber is also adjustable to a recoil frequency most desirable for the individual operator's comfort.

Finger-tip steering through a hydraulic booster arrangement requires steering effort of only one pound at the rim of the 20" wheel. All tractor controls are readily accessible to the operator. The dash is provided with a lubricating oil pressure gauge, a temperature gauge, a tachometer, an ammeter, a vacuum gauge for the air brake system, and a fuel oil gauge.

The left-hand hood door of the tractor is unperforated to prevent engine heat from blowing into the operator's face. Immediately to the right of the foot brake pedals is a small door which can be removed in winter operation to admit a draft of hot air from the engine directly to the operator's position. Electric starting and sealed beam headlamps are standard equipment on this new tractor.

The dump wagon has 8 1/3 cubic yards struck measure capacity, and 11 cubic yards heaped measure capacity. The body is of the hopper type to provide a large target, insuring economical loading operations with any type of loading equipment.

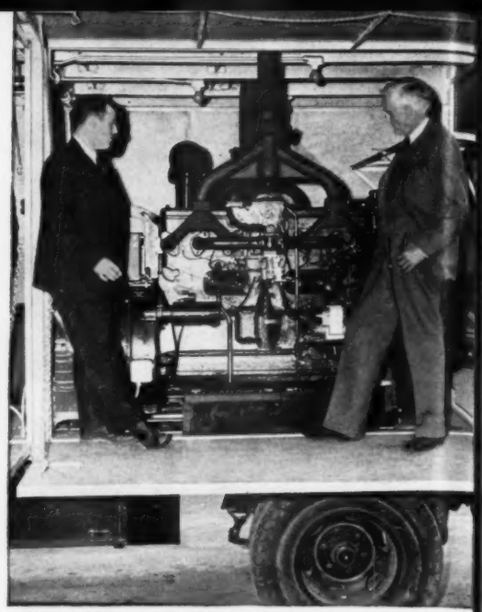
Miss Lou Blanton just before she sponsored the new Navy tug "Alliquippa", at the yards of the Gulfport Boiler & Welding Works, Port Arthur, Tex., June 14.



Mrs. L. C. Heare, wife of Dr. L. C. Heare, Mayor of Port Arthur, as she prepared to sponsor of the U. S. Navy tug "Wapello", at Porth Arthur May 10.

BRUNO SCHULZ LAUNCHES TWO MORE NAVY TUGS

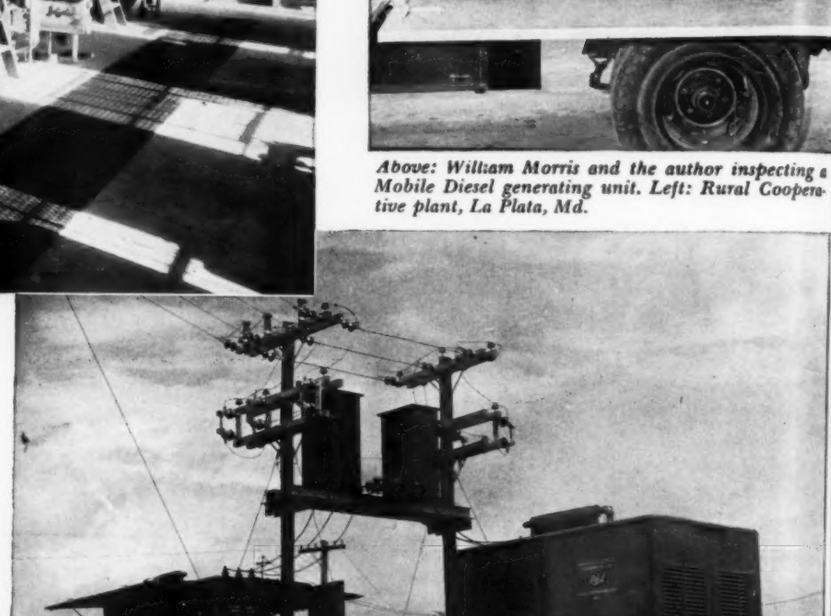
BRUNO R. Schulz, President of the Gulfport Boiler & Welding Works of Port Arthur, Texas, has developed one of the outstanding shipyards on the Gulf Coast for the building of tugboats, oil barges, and similar welded craft. Two of the latest ships to come out of the efficient yard are the U.S.S. *Wapello* and the U.S.S. *Alliquippa*. These two tugboats are duplicates in practically every respect of the *George W. Codrington* which was described and illustrated on pages 24 and 25 of the December, 1940 issue of DIESEL PROGRESS. Each vessel is 102′ 2″ with a moulded beam of 24′ and a moulded draft of 12′ 4″. Power plant is a 12 cylinder, 2 cycle, streamlined V-type General Motors Diesel, 8½″ x 10½″, rated for service in these vessels at 1200 bhp. at 750 rpm., which gives 1000 shp. at the propeller. The *Wapello* was launched on May 10 and was sponsored by Mrs. L. C. Heare, wife of the Mayor of Port Arthur, Texas. The tug was inspected and passed by Lieut. W. J. McCafferty, Assistant District Materials Officer from Galveston and was taken over on June 10 by Commander Robert R. Ferguson, Port Director for the U. S. Navy at Port Arthur. The *Alliquippa* was sponsored by Miss Lou Blanton, daughter of Port Arthur's Chamber of Commerce Manager, and was launched June 27 and delivered July 7.



Above: William Morris and the author inspecting a Mobile Diesel generating unit. Left: Rural Cooperative plant, La Plata, Md.

A REPORT ON R.E.A.

By FRANKLIN P. WOOD



Two mobile Diesel generating units and substation serving the Jo-Carroll Electric Cooperative, Elizabeth, Ill.

EXCEPT for those who come in direct contact with the Rural Electrification Administration or those who are directly affected by it, there seems to be considerable confusion in the minds of many people as to its functions and aims. This appears to be particularly true of engineers and manufacturers who are not touched by its activities in some way or another.

Instead of being "another method of reaching into the taxpayers' pockets" as is sometimes remarked, the REA is really an institution that is not costing the taxpayers a cent, except for the comparatively small administrative expense necessary for its proper functioning. On the contrary, it is adding millions of dollars of use value to the farm areas of America and incalculable values in social and economic ways. It is also giving practical experience in applied democracy to millions of people who have never before had the opportunity to know at first hand the great value of cooperation in building up such values.

The Rural Electrification Administration was instituted by Executive Order of the President in 1935. A year later, the Congress put it on a more permanent basis through the Rural Electrification Act of 1936, which provided for the ultimate lending of $420,000,000 over a ten-year period. On July 1, 1939, it became an Administration within the United States Department of Agriculture. It is now thought that the REA will become a billion dollar institution before long. The reason for instituting it was found in the fact that of the 7,000,000 farms in the United States, only about 10 per cent had the advantage of central station electric service. Today, the percentage is above 30. More than half the farms newly connected during the past six years are served by systems financed by the REA.

Specifically, the REA is a lending agency, and is operated as any good banking agency is operated. The Act provides that the REA may lend money to private corporations, to municipalities or other public bodies, and to cooperatives for the purpose of furnishing electricity to persons in rural areas not now receiving central station service. In other words, it cannot lend money that will be used for competing with existing agencies, either public or private. It may not go into towns of more than

1500. All of REA loans must be repaid to the Government with interest over a period of twenty or twenty-five years. The Administrator is charged with the responsibility of lending only to agencies which, in his opinion, will be able to comply with this requirement. Since the loans are self-liquidating, it is clear the money does not come from the taxpayers' pockets.

When the REA was first set up, it was thought that private utilities would be the principal borrowers. This did not prove to be the case. In order to accomplish the provisions of the Act, the three REA Administrators have made most of their loans to farmers' cooperatives newly organized to serve their members at cost. As a result, 95% of the money has been lent to self-governing cooperatives or to public bodies. Thus, a most interesting and valuable trend has been fostered. The actual process is as follows: The farmers and other rural residents of a community, wishing rural electrification in their territory, come together in preliminary meetings and discuss the question either with or without a representative of the REA. The situation is canvassed and those who wish electric service sign applications prepared for that purpose and apply to the REA for a loan. A pre-allotment survey is then made, and a map prepared for submission to the Applications and Loans Division of the REA in Washington. The Rates Section of the Cooperatives' Operations Division carries on negotiations with existing power companies, municipalities or other agencies having power to sell. If a satisfactory wholesale rate is not obtained, an allotment may be made, then or at a subsequent time, to provide an independent power source.

If the study indicates that the project is feasible; that is, that it will be self-liquidating, an allotment is made. The provisional organization is made permanent under the laws of the State in which it is located, a Board of Directors is elected with the usual complement of officers, a superintendent, and necessary office force employed, loan contracts, notes and mortgages executed, and, when approved by the Administrator of REA, the money is made available. Engineers and lawyers are employed (to be paid from the allotment), plans and specifications made for the building of the lines and necessary substations, plants, etc. Contracts are entered into (sometimes the work is done by force account) and the system built. Upon completion, the electricity is turned on and operation of the system is taken over by the superintendent under the direction of the Board of Directors. An election is held each year by the members of the Cooperative to select the Board members for the following year. The organization thus becomes a truly self-governing, democratic cooperative.

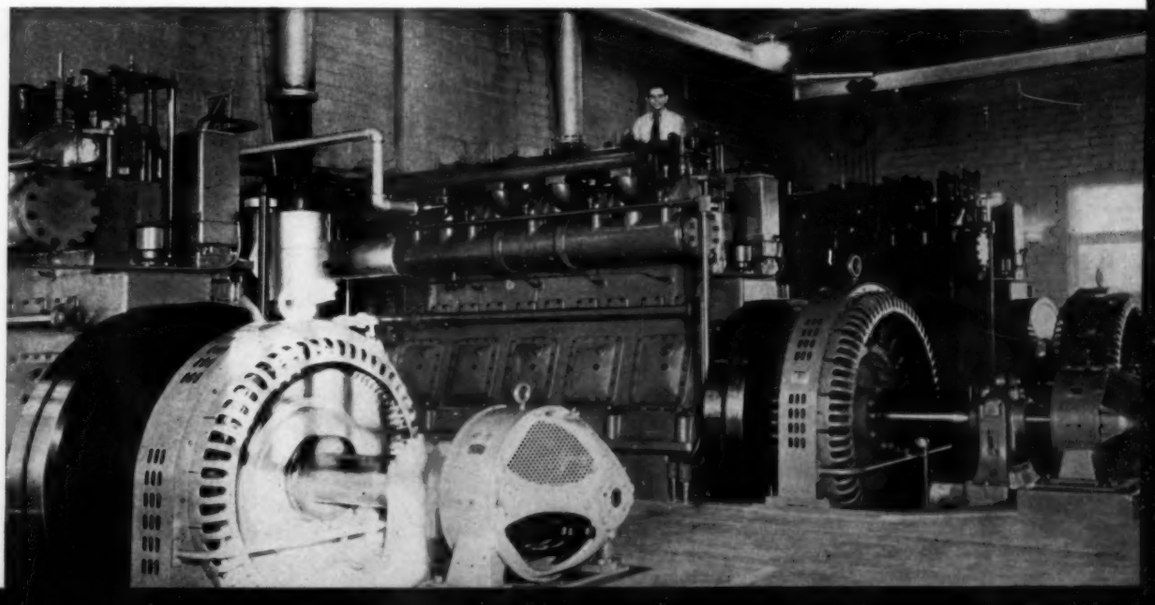
The only money put up by the members is a membership fee of $5 each. This goes into a fund for preliminary purposes, later reimbursed from the loan, if one is made, and forms a fund for the Cooperative to use as it may desire. All other money required is furnished by the Government at interest rates of about 2½% per year and returnable on a 25-year basis. The money for retiring the loan is obtained from the member-users in the form of monthly bills rendered for the use of electricity. In other words, the retail rates for service include all operating costs and interest and amortization, strictly on a cost basis. The average cost to members for retailed electricity is now under 5 cents per kwh.

No member has any personal liability, nor is there any liability placed on any of his property. The Government has as its security only the lines and plant constructed with the loan. The membership has no financial responsibility except to take and pay for the service. The system, of course, when liquidated, becomes the property of the Cooperative, without any obligations attached to it.

The question frequently arises as to whether the systems' financial obligations are being met. The answer is "yes," although there have been only a few years of actual experience. As of February 28, 1941, there was due from 419 borrowers $7,333,114.64. As of the same date, 485 borrowers had paid $9,755,668.84, which included advanced payments from 275 borrowers of $2,608,749.24, with only $186,195.04 overdue from 51 borrowers. This indicates a healthy trend. As a matter of fact, most of the 51 borrowers 30 days overdue in payments will undoubtedly catch up before the end of the year.

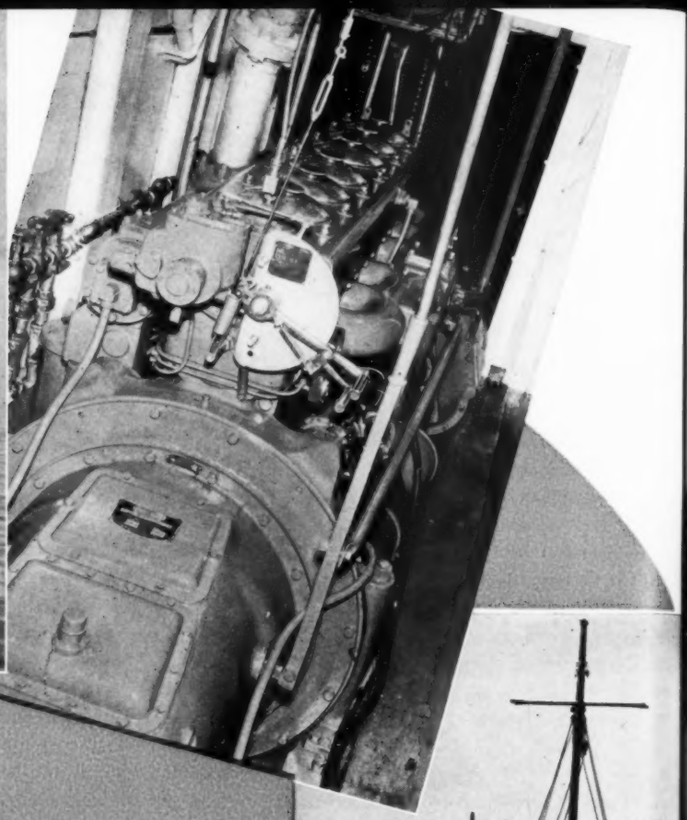
A brief word about the power plants constructed by REA may be of interest to DIESEL PROGRESS readers. A number have been described in past issues. The total money allotted for all REA projects to 792 borrowers was $352,379,621.22 (as of January 10, 1941). Of this, $10,703,500 was allotted for 43 generating plants. At that time 31 plants were in operation. The majority of plants are Diesel-equipped, although some use natural gas, some hydro, and this year will see the start of operation of REA's largest plant, a steam plant located on the Mississippi River at Genoa, Wisconsin. By the end of the year it will have a capacity of 18,000 kw.

This plant is to be interconnected with REA's largest Diesel plant in northern Wisconsin (4200 kw.) and the two, plus some additional capacity now contemplated, will ultimately have a combined capacity of 25,000 kw., will supply 50,000 farm members, and will have, including the distribution lines owned and operated by distribution cooperatives, an investment of $25,000,000. The combined cooperative will be the largest one in the United States up to the present time, and this means the largest cooperative electric power system in the world. As of January, 1940, the various REA generating plants had 99 units, with a total capacity . . . . . *And now please turn to page 67*



Three Diesel generating units in the first cooperative plant established in this hemisphere, the Shenandoah Electric Cooperative, Dayton, Virginia.

A fast, long range halibut vessel plying Pacific waters. Her Murphy Diesel propulsion engine with Twin Disc reverse and reduction gear is at the right.

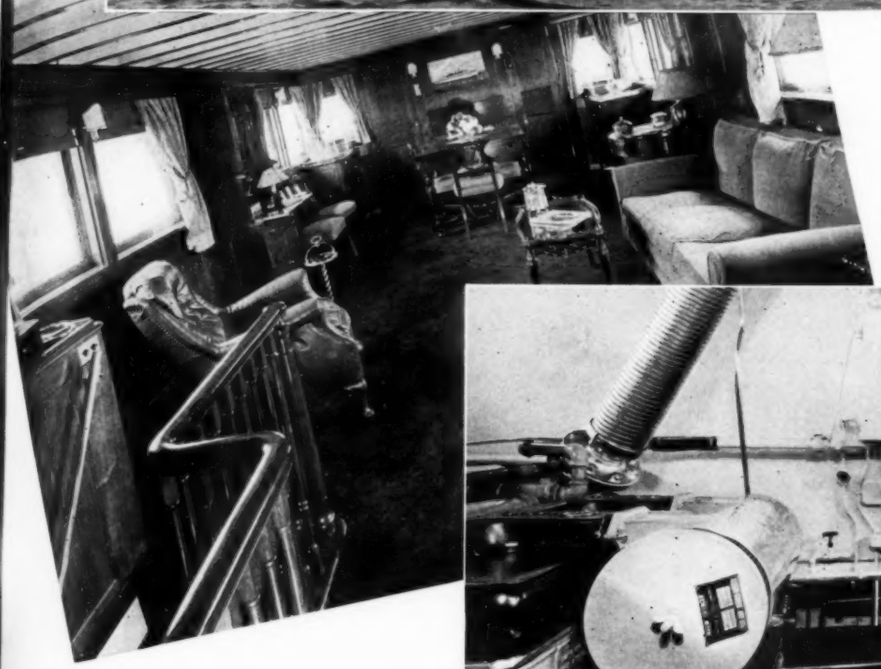


HALIBUT FISHING VESSELS

One of the newer types of halibut fishing vessels, Murphy Diesel equipped and capable of making eleven knots.

Another Pacific fishing vessel, carrying a Murphy Diesel with Twin Disc reverse and reduction gear, owned by Mel Wich, of Seattle.

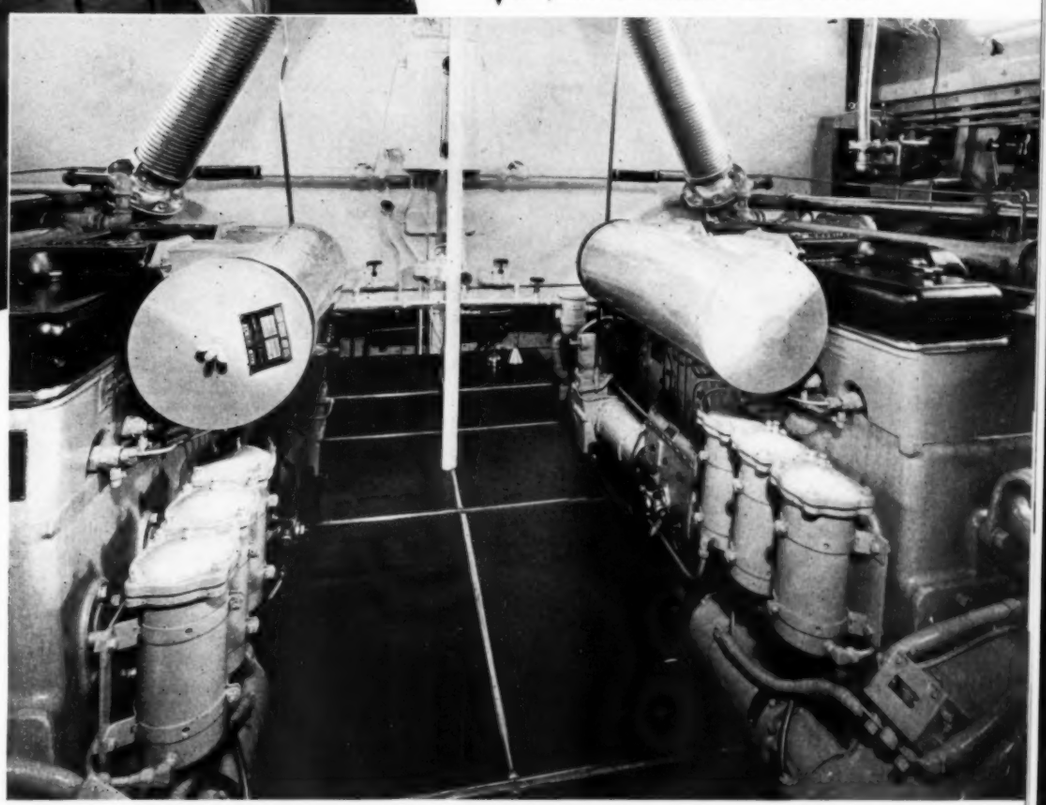
THE Diesel ship *Majestic* is a two masted halibut schooner 66′ long overall, 15.8′ beam, 8.5′ draft of 49 gross 33 net tons, and is powered with a 160 hp. supercharged, 6 cylinder Murphy Diesel Marine engine with 3:1 reverse and reduction gear, swinging a 51″ x 31″ wheel. She is owned by Capt. Carl Abrahamsen, Seattle, Washington. In the speed trials this vessel was clocked at approximately ten knots, making it one of the fastest boats in the Seattle halibut fleet. These vessels are used for fishing in the North Pacific halibut banks which involves a long run from Seattle, and the added speed is expected to permit one extra trip each season which is limited to less than seven months. The compactness of the Diesel and the saving in weight as compared with the former engine have released valuable fish hold space. The *M. S. Destiny*, another halibut fishing vessel, is 58′ long overall, 15′ beam and is powered with a 135 hp., 6 cylinder, Murphy Diesel Marine engine with 3:1 gear swinging a 48″ x 36″ wheel. This vessel is owned by Olaf Jangaard of Tacoma, Washington. It is of the new type North Pacific halibut fishing boat having the pilot house forward and the fish hold aft of the wheel house location in contrast with the two mast type as represented by the *Majestic* referred to above. Here again the ability of the boat owner to ship more power in small space and thereby increase his cargo capacity results in greater earning power of the boat.



This Diesel, twin screw, cruising houseboat made 15 mph. at 1500 engine rpm. on trials, a rather good speed for a vessel of her type.

A view of the luxuriously appointed, spacious deckhouse living and dining room.

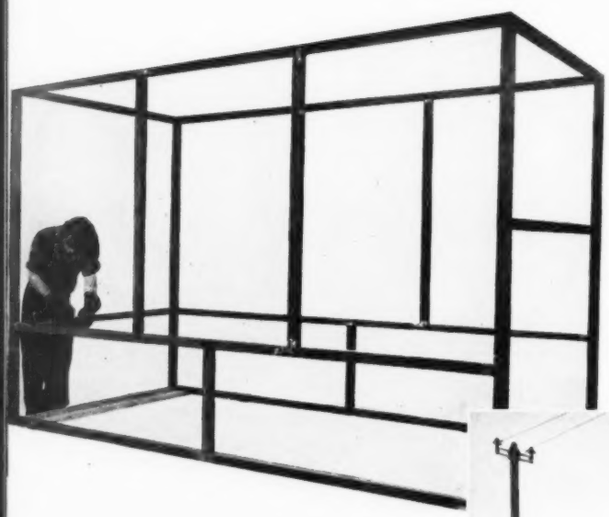
View of the unusually roomy machinery space showing the pair of Superior Diesel propulsion engines. Note Purolator lube oil filters and Maxim intake silencers.

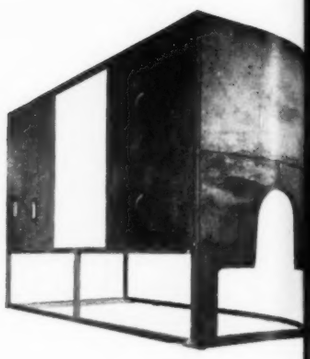


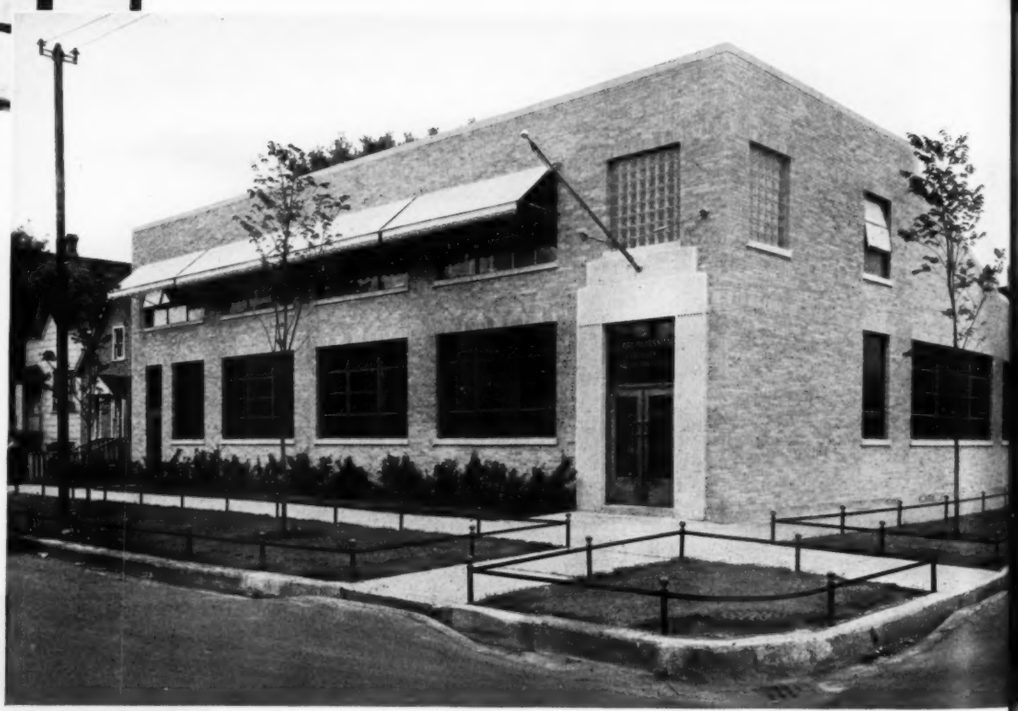
DIESEL YACHT

"Drifter"

THE "Drifter", a modern and luxurious yacht of the cruising houseboat type, is the latest of a long series of such vessels popularized by the clever designs of John Trumpy and the excellent workmanship of Mathis Yacht Building Company of Camden, N. J. Built for Mr. Frank O. Sherrill of Charlotte, N. C., this interesting yacht made fifteen miles per hour at 1500 rpm. and 12.5 miles per hour at 1100 rpm. on trial runs with her pair of Superior Diesels turning twin screws. These Diesels are twin right and left Model MRD, six cylinder engines, 5½″ bore, 7″ stroke, 4 cycle, rated 170 hp. at 1500 rpm., driving through a Joe's 2:1 reduction gear to 32″ x 32″, three blade propellers. The engines are each fitted with triplex Purolator lube oil filters, American Bosch fuel injection systems and specially designed Maxim intake silencers. Her machinery space is large and carries a full complement of auxiliaries. The "Drifter" has an overall length of 76′, a beam of 16′ 6″, and a draft of 4′ 2″. In addition to extensive quarters below decks, the large deckhouse encloses a homelike combination living and dining room which is richly carpeted and appointed with deeply upholstered furniture.







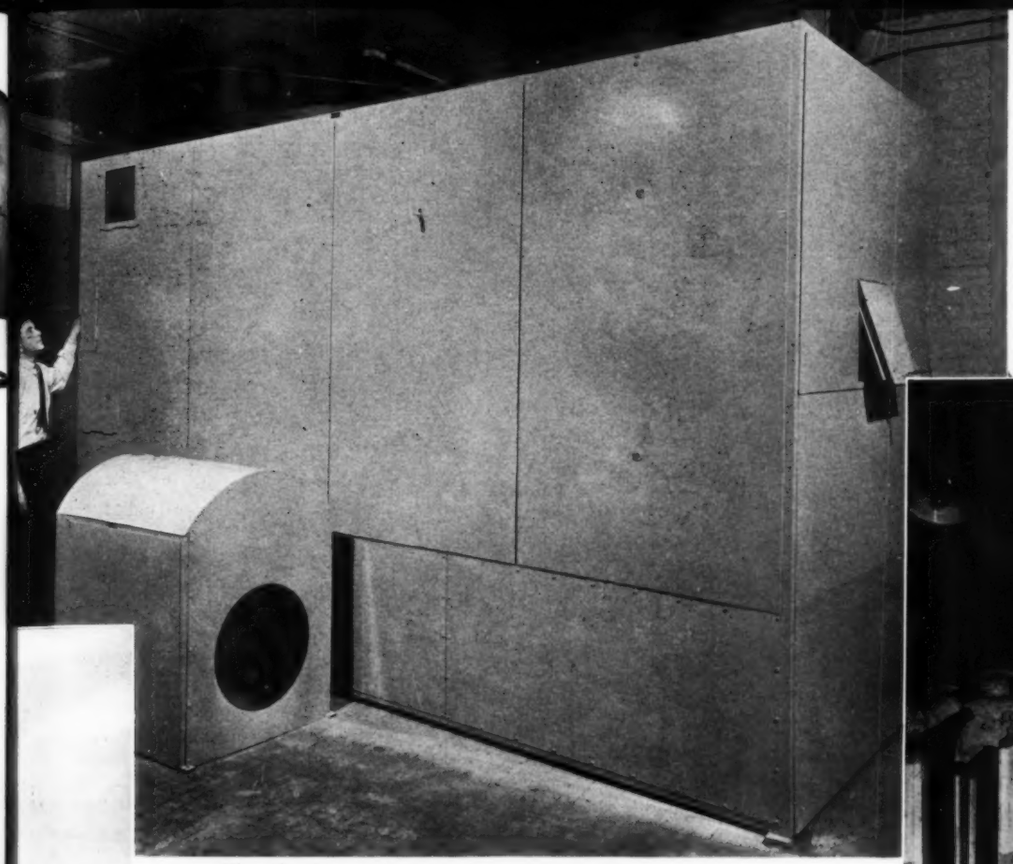
Above, left to right—a completely assembled frame. Next is seen a side section of the frame and next, the completed frame with some panels in place. Note, the hood covers the engine only and in this case, the opening is for the generator. View to the right shows the new Carl Hussman plant in Chicago.

SILENCING HOODS FOR DIESELS

"STOP NOISE AS CLOSE TO ITS ORIGIN AS POSSIBLE"

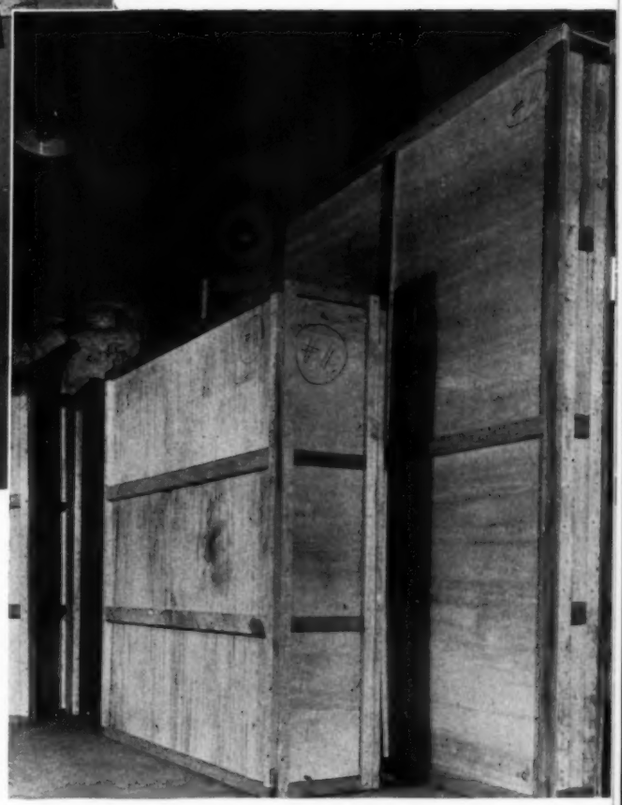
APPLYING the knowledge gained in twenty years of experience with problems of vibration and noise elimination, Carl Hussman, of Chicago, specialist in solving vibration and noise problems, has developed a Silencing Hood for Diesel engines on the theory that the time and place to deal with noise is right at its source. On shipboard, in buildings public and private, much has been said and done about engine room insulation—but still the engine room is noisy—and noises once released to run wild seek every open door, ventilator and window not to mention the ears of those within the room. Here, then, is equipment that would seem to remove the last odium of the Diesel engine and to greatly further the almost universal availability of this most efficient and dependable prime mover.

The Silencing Hood is simplicity itself—as are many effective devices. It is made up of a sturdy frame built of square, seamless steel tubing which is packed with a fireproof, acoustical material. The panels are steel plates all around, sprayed on the inner surfaces with a sound deadening coating and the space between the plates filled with fireproof, acoustical material within an overall thickness of 1½". Panels are locked in place with removable keys and are fitted with ample observation windows as well as pipe seals for intake, exhaust and water connections. The locking arrangement



View showing comparative sizes of silencing hoods. The large hood is for a 16 cylinder, 1500 hp. Diesel; the small one is for a 4 cylinder, 25 hp. Diesel.

Three sizes of pipe seals for engine intake, exhaust and water connections through the silencing hoods.



Silencing hood frames are knocked down and together with the panels are packed in these two compact cases for shipment and facile loading aboard ship.

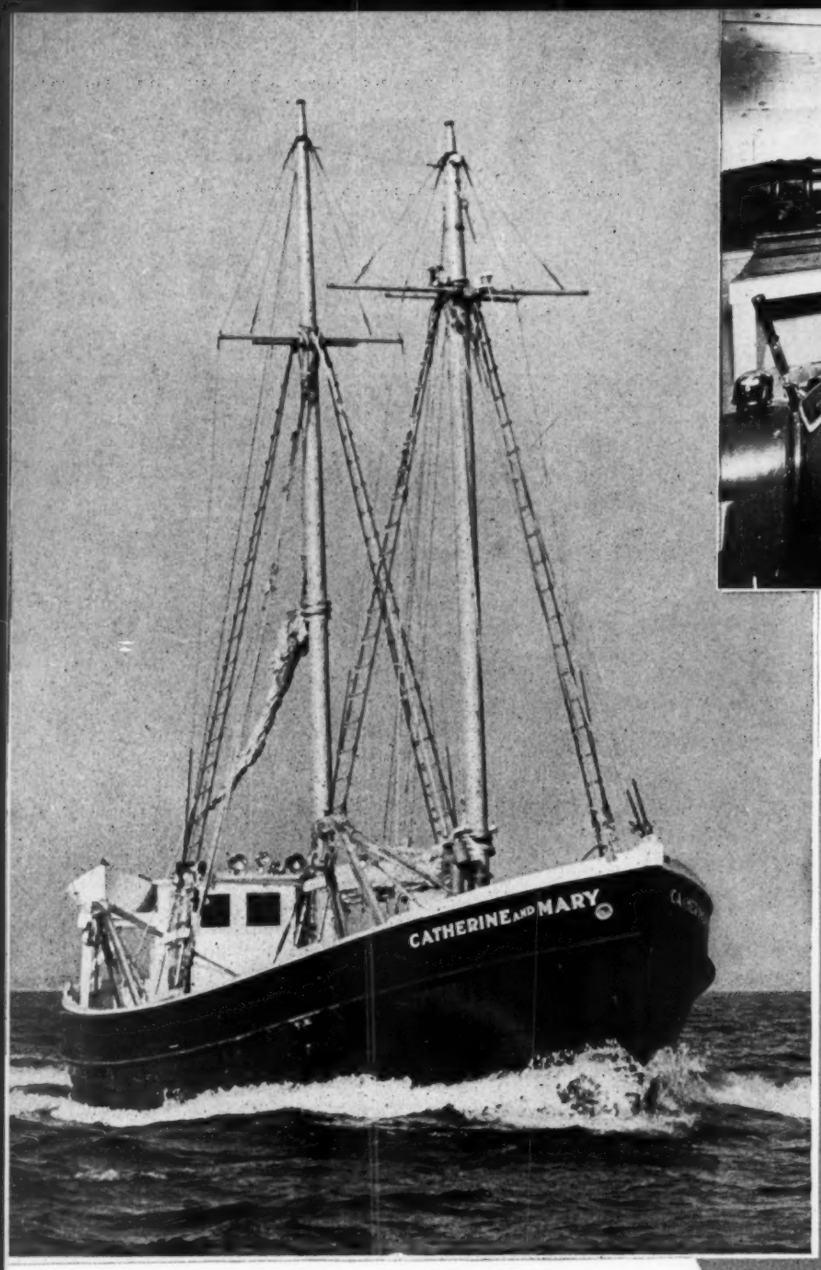
A corner of the Hussman plant where the hood panels are fabricated. Note the completed spring bases in the foreground.

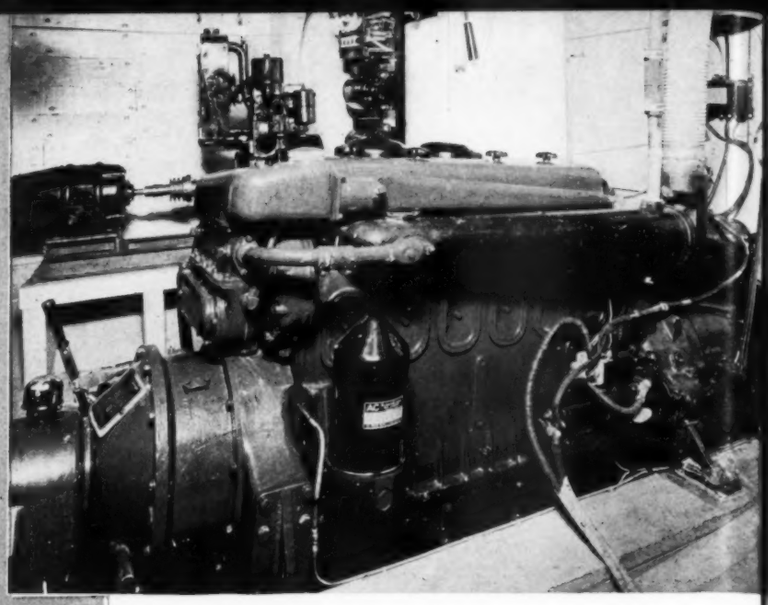
permits quick removal of the panels and complete accessibility to the engine.

That's it—nothing more except the two most important questions:—how can such bulky equipment be gotten into an engine room and placed over an engine on shipboard, for example—and what does it really do.—The panels are, of course, flat and both easily and quickly removable; the frame sections are keyed together so that the entire frame may be knocked down in a short time to permit packing of the entire unit in two compact containers.

According to tests the sound transmission losses through these panels are the very most that have so far been possible to achieve with a panel 1½" thick.

It is not surprising that the modern new plant which Carl Hussman moved into two months ago is already crowded with production of Silencing Hoods—in addition to the widely known Hussman Spring Mountings for engine vibration elimination. Successful installations of the Hoods in the Marine field include a wide range of representative Diesels up to sixteen cylinder, 1500 hp. main propulsion units. The Hoods are manufactured in sizes suitable for engines from small auxiliary units up and they kill the noise as close to the origin as possible, —stop noise before it has a chance to run wild.





Seen above are the Gray Marine Diesel propulsion engine and, in the background, the Atlas Diesel auxiliary generating unit.

CATHERINE AND MARY

By DWIGHT ROBISON

AN outstanding all Diesel fish boat embodying a number of noteworthy construction features was completed by Casey Boat Building Company of Fairhaven, Massachusetts, late last year and was put into service the first of the year under command of her owner Captain Isaac Norton of Edgartown, Massachusetts. This new dragger, *Catherine and Mary,* has an overall length of 71'3", a beam of 17'4" and a draft of 8'6". For propulsion, she carries a 6 cylinder, 165 hp. fresh water cooled Gray Marine Diesel driving through a 4:1 reduction gear and a Twin Disc reverse gear. The power take-off for the winch drive is fitted with a Twin Disc 3:1 reduction gear clutch. Delco-Remy electric starting motor and generator and Harrison heat exchanger are fitted to the engine. Auxiilary generating equipment consists of a single cylinder, 5 hp., Atlas Diesel engine, direct connected to a 1,500 watt generator. Construction details of the *Catherine and Mary* are high-lighted by the long straightness of her sides and an exceptionally full forward deck. The large forecastle is mahogany finished and porvides accommodations for eight men. The captain's and engineer's quarters aft are roomy, well lighted and ventilated by six port holes. The three fuel tanks, set against the forward engine room bulkhead, have a capacity of 1,500 gallons. The fish hold, forward of the engine room, is divided into five sections on each side and has a total capacity of 75,000 pounds. She is equipped to drag from one side. The aft starboard gallows frame may be moved to the forward port side for scalloping; she is schooner-rigged, and may be fitted for swordfishing.

WHITCOMB DOUBLE-DIESEL LOCOMOTIVE

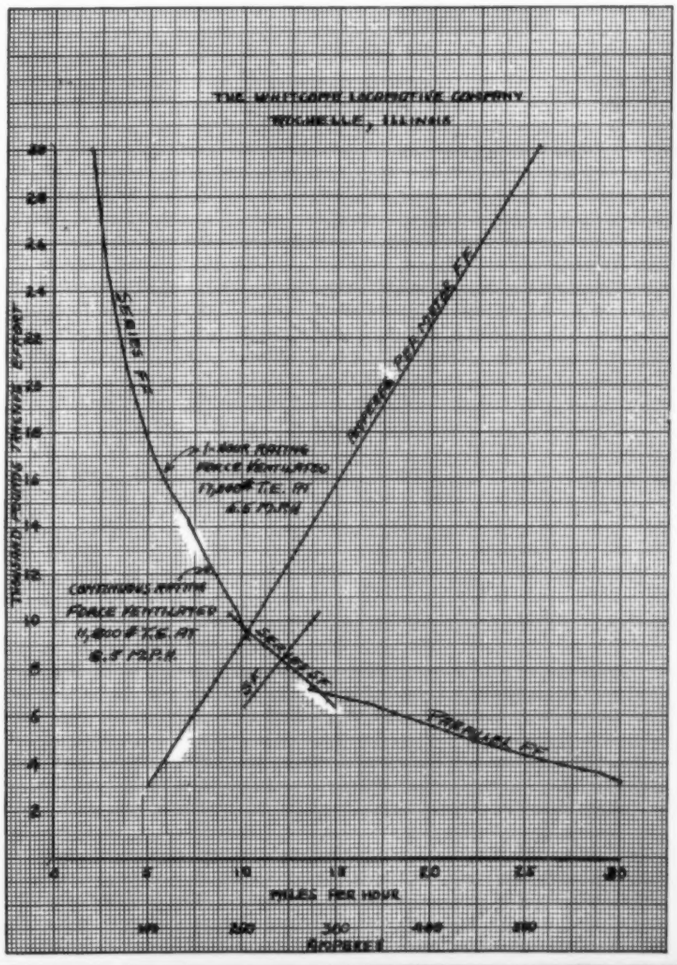
A 44 ton, 0-4-4-0 type, double-end-Diesel-electric locomotive built by Whitcomb Locomotive Company.

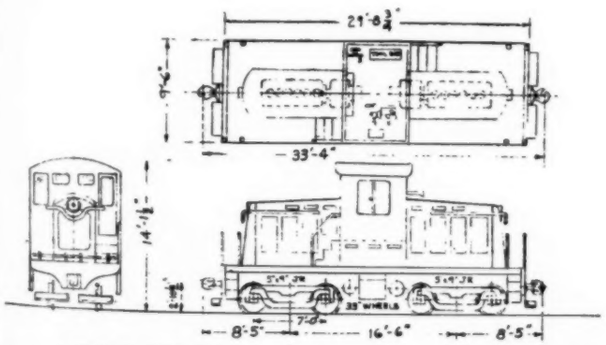
A NEW and interesting Diesel-electric locomotive has been developed by Whitcomb Locomotive Company for the Missouri Pacific Railroad. This is a 44 ton, 0-4-4-0 type, using two Hercules Diesels of 6 cylinders, 5½" bore by 6" stroke, rated 193 hp. at 1600 rpm. each. The Diesels are mounted at opposite ends, under sloping hoods which are designed for maximum visibility from the engineer's station, an essential feature with one-man operation. Vertical, hinged doors in the sides of the hoods provide for complete accessibility to the power plant for inspection and repairs.

Direct connected to the Diesels through flexible steel plate couplings are two Westinghouse shunt wound generators of 300 amperes continuous rating. The traction motors are mounted one on each of the four axles and drive through gears having a 13:75 ratio. Each of the motors is rated for 240 amperes at 250 volts with ventilation at 400 cfm. Each Diesel carries filtering equipment consisting of a Purolator and a Cuno in combination for cleaning fuel oil and Purolator and Michiana filters in combination for continuous clarification of lube oil. A pair of Air Maze oil bath air filters are fitted to the intake of each engine. Engine cooling is effected by a closed system with Modine sectional core radiators located one on each end of the locomotive. The engines are started by motoring the generators, using current from a 64 volt Exide, locomotive type storage battery. Engine speed is controlled by manual throttle which is located, as are all other operating levers and controls, at the engineman's station. The cab, located centrally, is thoroughly insulated against heat and cold and is particularly free from noise and vibration. The latter condition is attributed in part to the well-balanced and quiet operation of the Hercules Diesels.

The first locomotive built to these specifications is being tested at various points in the Missouri Pacific system before it is placed on a permanent assignment. Two identical units have been delivered to the Chicago & Northwestern and the Chicago, Milwaukee, St. Paul & Pacific lines for observation under varied conditions.

Speed Tractive Effort Curve
Diesel-Electric Locomotive
2—193 hp., 1600 rpm.
2—193-A Railway Generators
4—908-G-2 Railway Motors
13:75 Gear Ratio—33" Dia. Wheels
Input to each Generator 180 hp. (Approximate)





ENG'S (2) { HERCULES MODEL DFXD
6 CYL - 4 CYCLE
5½" x 6" - 193 H.P. EACH 1600 R.P.M.

GENERATOR'S (2) { WESTINGHOUSE TYPE 193-A
SELF EXCITED WITH ADDED BATTERY BOOST

EXCITER GENERATOR —

TRACTION MOTORS (4) WEST. TYPE 908-G-2

AIR BRAKE - W.A.B. - 14-EL.

STORAGE BATTERY { 32 CELL - 13 PLATE
EXIDE IRONCLAD - MV-13-D

FUEL OIL CAPACITY - 50 GALLONS

LUBRICATING OIL CAPACITY - 50 GALLONS

AIR COMPRESSOR (2) { 2 CYCLE - 2 STAGE - AIR COOLED
GARDENER - DENVER - ADS
50 CU. FT. AT 870 R.P.M.

FUEL OIL CAPACITY - 300 GALLONS

MAX. OPERATING SPEED - 30 M.P.H.

MIN. CURVE RADIUS - 75 FT.

WEIGHT WORKING ORDER - APPROX. - 88,000 LBS.

WEIGHT ON DRIVERS APPROX. 88,000 LBS.

LIGHT WEIGHT - APPROX. - 84,000 LBS.

TRACTIVE POWER - 22,000 LBS. AT 25% ADHESION

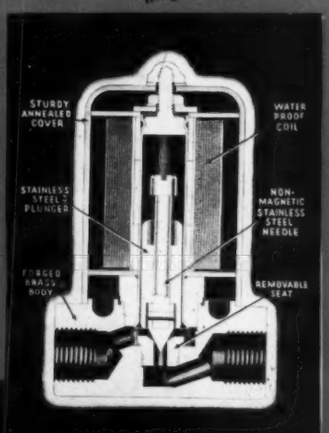
THE WHITCOMB LOCOMOTIVE CO.
ROCHELLE, ILL.

Exterior view of the Penn cooling water temperature control switch.

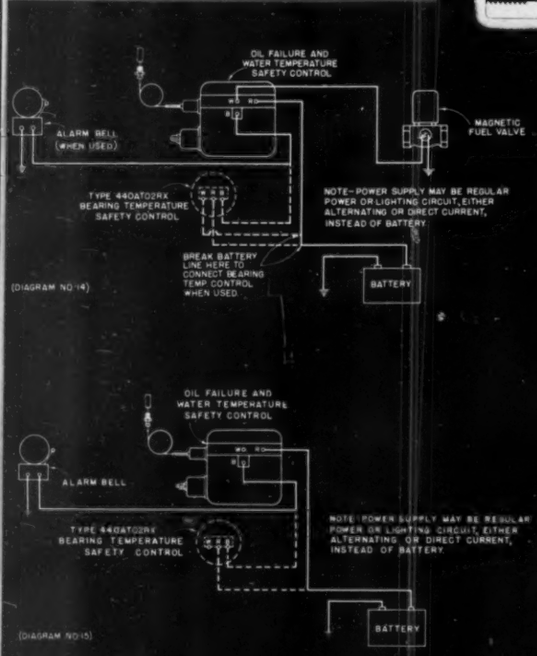
Exterior view of the Penn lube oil pressure control.

Exterior view of the Penn magnetic fuel valve.

Penn Series 261 combination cooling water temperature and lube oil pressure control.



Cross section of the magnetic fuel valve.



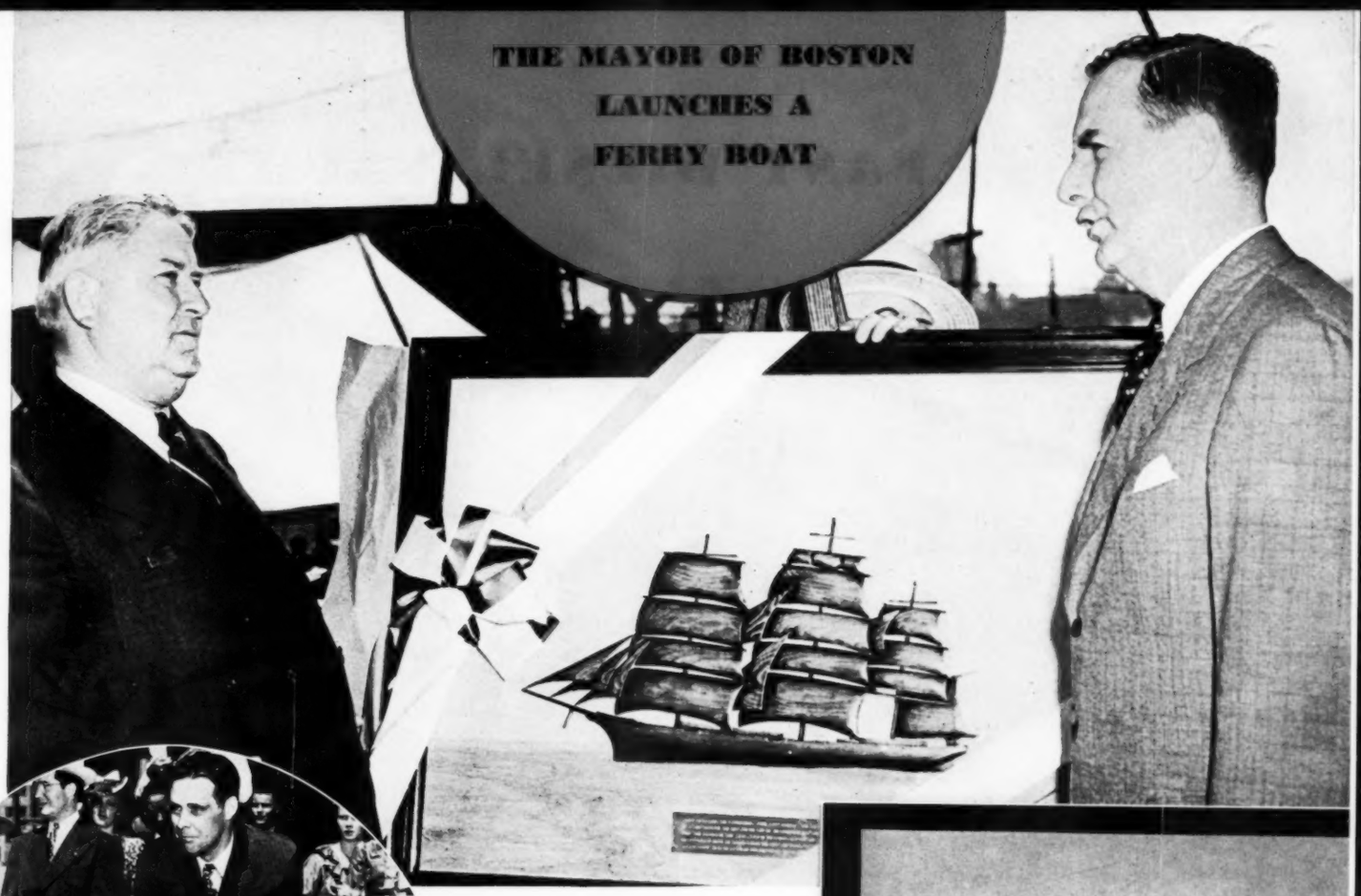
Left, top drawing shows control circuit for Diesel engines with magnetic fuel valve, oil failure and water temperature control switch. Lower drawing shows control circuit for Diesel engines with alarm bell on oil failure and water temperature control switch.

Exhibit of Penn Electric Safety Controls at the Kansas City meeting of the Oil & Gas Power Division of the A.S.M.E.

SAFETY CONTROLS FOR ENGINES

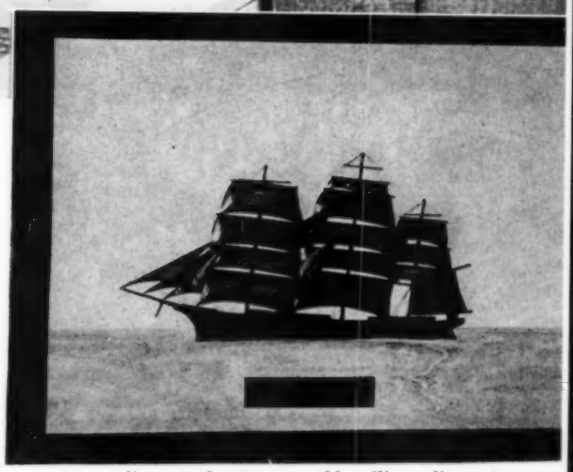
GAS and Diesel engines in either stationary or mobile applications can be fully protected against shutdown due to lube oil failure, cooling water failure, and overheated bearings, yes, and even subnormal bearing temperatures. Prominent among the devices offered for such protection of costly engines, many of which have been described in previous issues of DIESEL PROGRESS, are the automatic safety controls manufactured by Penn Electric Switch Co. The elements of a complete Penn automatic safety control set consist of a control switch and a magnetic fuel valve. The control switch is arranged as a lube oil pressure failure alarm control, an overheated cooling water temperature alarm control or as a combination pressure and temperature unit. The control switch when used in conjunction with the magnetic fuel valve, which is designed for installation in the fuel feed line ahead of the injection pump on Diesel engines, forms a complete automatic safety alarm and engine control set which provides both warning of and protection against costly shutdowns. The line of Penn controls includes also a control valve designed to modulate cooling water pressures and inlet temperatures to meet engine cooling needs which fluctuate due to load variations, as well as an automatic control for parallel engine operation.

THE MAYOR OF BOSTON LAUNCHES A FERRY BOAT



George W. Codrington presented a replica of the "Donald McKay" to E. G. Diefenbach and Mr. Diefenbach said "thank you" very nicely.

Mayor Maurice J. Tobin of Boston did a serious, workmanlike job of cutting the rope which held the Diesel Ferry "Hudson" on the ways.



A replica of the famous old sailing clipper "Donald McKay." The "Hudson" is the first ship to be built in this yard since the old clipper days of 1869.

Diesel Electric Ferry "Hudson" successfully launched at East Boston, June 28th, 1941.

SHIPBUILDING within the city limits of Boston had become almost a lost art until the General Ship & Engine Works laid the keel of the Diesel Electric Ferry *Hudson* on the same ways from which the famous old sailing ship—the Clipper *Donald McKay* was launched almost a hundred years ago. So June 28th was a big day in East Boston—the *Hudson* was launched with a flourish, with enthusiasm and with much noise. Mayor Maurice J. Tobin chopped the hawser which started the *Hudson* down the ways. His very attractive young wife did an excellent job of christening the vessel and George W. Codrington, prexy of the Diesel Division, General Motors Corporation, made a short, well worded speech in which he presented a replica of the *Donald McKay* to E. G. Diefenbach, prexy of the Electric Ferries, Inc. The Diesel Ferry *Hudson* is the fourth of a set of quadruplets which Eads Johnson designed and which George Codrington has powered for the Electric Ferries, Inc. in New York. All four ships are Diesel Electric drive jobs using but one 950 hp. 12 cylinder, two cycle unit of the new streamline G-E model. They are 185 foot ships, all welded construction and extremely fast and quick handling for their size and power. The *Hudson* will operate between 69th Street, Brooklyn and Staten Island, N. Y. helping out her sister ship the *Gotham* which went on the line last May. Traffic on the Brooklyn-Staten Island run has more than doubled this year—Electric Ferries, Inc. needs the *Hudson*.

FAST DIESEL YACHT

By WILL H. FULLERTON

THOSE who recall the "Trouper," which was described in DIESEL PROGRESS for September, 1939, will recognize a striking similarity between her and this handsome yacht recently ordered from Robert Jacob, Inc., City Island, New York, for Major Max C. Fleischmann of Glenbrook, Nevada. John H. Wells of New York prepared the designs for both the "Trouper" and this interesting new craft and, likewise, the plans for both of these vessels were made by the same naval architect.

This new Diesel yacht will be of welded steel hull construction, 127′ long, 21′ wide, and 7′ draft. While this vessel will be unusually light in construction, the fuel capacity will be beyond that previously installed in any boat of the express type, there being 6,200 gallons of fuel which will give the yacht a cruising radius of 1,500 statute miles at 15-knot speed, and 7,000 statute miles at 10-knot speed. Her normal cruising speed will be 15½ knots. The power plant will consist of two 600 hp. supercharged Cooper-Bessemer Diesel engines, fresh water cooled.

The yacht will have an unusual amount of electrical equipment, including two 20 kw. lighting plants, air conditioning, heating, special ventilating systems, photo-electric steering, direction finder, electric refrigeration, long range ship-to-shore telephone, complete radio equipment, and bridge controls.

This vessel will be used on the West coast, cruising from Mexican to Alaskan waters, and will consequently be equipped with such air conditioning devices as will enable the owner and his guests to be entirely comfortable.

As the owner may be called to active duty in the event that this country enters the war, the vessel will be available to the Navy Department should they care to take her over and convert her to meet their requirements.

PISTON RINGS

By R. L. GREGORY*

THE subject of Piston Rings is one of great importance to the Diesel Engineer, since they form one of the major items of maintenance expense in Diesel Engine operation. Much has been written, many theories advanced, and many experiments have been carried on as regards the design and composition of piston rings. Every engineer is the recipient of advertising materials from ring manufacturers, extolling the qualities of his rings, and holding to the claim that he has the best piston rings on the market. Consequently when the average engineer is confronted with the problem of ring replacement, he is often in a quandary as to just what ring to use for longevity and, at the same time, obtain efficient results.

Now some engineers may take exception to this statement, especially those engineers who practice "Preventive Maintenance" insofar as keeping the contributory factors which effect ring breakage at a minimum, thus giving their rings a "break", so to speak. But, generally speaking, engineers are always wondering just what is the best ring to adopt. Assuming that you as an engineer, are faced with this problem of ring replacement, let's discuss some of the points which bear on the subject.

In the first place, what is the function and purpose of piston rings? In answering, we know that any reciprocating engine which depends on the expansion or contraction of gases or liquids to produce work must be equipped with a means to prevent leakage or blowby. Hence the use of piston rings. They also help to dissipate heat, as well as maintain compression by eliminating blowby. In order to perform these functions properly, there are other contributory conditions which must first be considered.

Before installing a new set of rings, one of the first items to investigate is the condition of the liner walls. Too often engineers take this condition for granted. They know that the liner walls show wear, but feel that by the installation of a new set of rings as soon as they are worn in, everything will be all right. This is absolutely the wrong theory. Liner walls must be kept in condition. No ring, regardless of design or material will function properly, unless it has the cooperation of those in charge to eliminate causes which work adversely to the ring itself. Therefore, inspect your liners. If upon micing them up, you find the wear to be excessive, you may have to rebore the liner. This, however, occurs only in cases of extreme wear. By means of a portable grinder equipped with a good stone, the liner can be ground to an approximate finish, then completed with a good grade of oil stone. These stones should have one face, the arc of which is approximately the arc of the diameter of the original bore. They can be secured from most manufacturers of abrasive materials.

All engines, after operating for a period of time, develop a shoulder at the top of the stroke of the top ring. This should be removed at least on your annual inspection, since this shoulder is a contributory feature, which often causes breakage of the top piston ring. This, too, can be ground out.

A thorough inspection should be made of the exhaust port bridges. Often these are found to be expanded. When such is the case, proper clearances should be given at this point, since expanded exhaust port bridges are another contributory factor to ring breakage. The edges of the exhaust ports should be rounded off and exhaust ports cleaned. Often when a ring breaks, it becomes momentarily caught in the exhaust ports, and before it blows on through, the edge of the port has become nicked. These should be removed. Also inspect the lubricating ports, as they must be kept free from carbon and scale. When you are satisfied as to the proper condition of the liner, then inspect the piston head before installing your new rings.

One ring manufacturer makes the statement that, "No ring is any better than its groove". This is absolutely true. The vertical travel of the ring in the groove will, in time, wear a shoulder on the inner portion of the groove. These must be removed. If grooves are faulty, with battered edges or worn, no ring will function properly nor stand up under such conditions. These grooves should be absolutely clean and free from carbon before installing a new set of rings. It is well to have a good set of scrapers made to fit these grooves and kept with your maintenance tools, for this work. Now that this work is completed you are ready to install the rings.

The functions which your rings are required to perform necessitate certain definite requirements in the rings. Do not use a ring in your engines which, on the surface, shows an inherent characteristic weakness in design. Use rings made by a competent ring manufacturer who has a reputation to maintain. Bootleg rings will often cause more trouble and maintenance than the cost of the better grade of rings. There has been much discussion as to the proper composition of material from which rings should be made. Some manufacturers are of the opinion that both liners and rings should be made of the same material, possibly a high grade of cast iron containing a certain percentage of graphite. This seems to be feasible, since the graphite would furnish lubricating qualities and would be more or less porous, thus retaining the lubricant. For some time rings of such material have been obtainable, with excellent results. Another quality which rings must have in order to stand up is the quality of toughness which tends to maintain the ring tension over a long period of operation. Ring tension has been another point of argument, but we have found that rings of lighter tension have a tendency to "flutter" in the grooves since they do not compress as tightly against the cylinder walls. This "fluttering" is also a contributing factor to breakage. By using rings with 20 to 30 pounds more tension, ring breakage has been considerably reduced in many plants.

Another important factor in fitting rings is to obtain the proper gap or end clearance. Any ring, in order to prevent blowby, must seal properly at the ends. Experience will show the average engineer the proper amount of end gap allowance. In fitting your new rings, possibly the best method to use is to fit them to

. . . . . *And now please turn to page 66*

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* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

NEW SERVICE MANAGER FOR H. O. PENN MACHINERY CO.

WILMOT Sandham, better known as "Sandy" has been appointed Service Manager of H. O. Penn Machinery Co., distributors of Caterpillar and allied construction equipment lines. He will have complete supervision over all Service and Parts Departments, not only at the Manhattan headquarters but also at the Company's Mineola, Long Island, and Poughkeepsie, New York, branches, and the Parts Depot at Lackawack, N. Y.

During the past year "Sandy" has been a sales engineer for H. O. Penn, concentrating on power units and generating sets for industrial installations in the New York area. He has recently given a series of lectures in Brooklyn and New York on the subject of "Diesel Operation and Maintenance" for the National Association of Power Engineers.

Previously, he was Chief Instructor for the Hemphill Diesel School, having been transferred to New York from Los Angeles, California. While on the West Coast, he was connected with the Fairbanks Morse Company in their Diesel Engine Department.

His earlier experience likewise includes considerable time spent at sea on Tuna Clippers sailing in Pacific waters, as well as much training in the installation of boilers, steam engines and heavy repair work. This included Diesel repair and servicing of engines.

REA MOBILE GENERATORS IN FIRST EMERGENCY USE

THE REA-developed mobile Diesel generating plant has just completed, successfully, its first test in emergency use, following a blackout of Cascade, Idaho, the county seat of Valley County, by lightning.

The Long Valley Power Cooperative, Inc. of Donnelly has been using two of these self-sufficient moveable power plants for some time, pending completion of its new generating facilities. When lightning put the Cascade generating plant out of commission on June 27, the cooperative put one of the mobile units into service to the village residents within three hours.

Although the REA lines carry 7200-volts and the village lines 2400-volts, it was possible to adapt the mobile unit to the new voltage with only minor changes in the hook-up. In addition to this, it had to be disconnected from the cooperative's lines and moved 18 miles as a highway trailer before it could be put into service. However, the Cascade generating plant had been damaged to such an extent that there was no possibility of making repairs or getting substitute highline service for several days.

This arrangement left both the cooperative's lines and those of the village underpowered, but it was continued for five days until the village generating plant was repaired and again ready for service. The users on both systems reduced non-essential uses so that the two mobile plants were able to supply the demand of both systems.

The type of mobile generating unit which was used in this emergency was developed by the REA engineers working in conjunction with leading manufacturers. Each unit has two 50-kilowatt Diesel generators, its own switchboards and substation transformers. The units are so designed that they can provide from 240 volts to 13,200 volts with only minor changes in hook-up. Each carries fuel and water for 24 hours' operation, and can be towed along the highway at ordinary trucking speed. Although these mobile units have a rated capacity of 100 kilowatts, the unit in use at Cascade carried a load of 120 kilowatts for some time.

SUPERVISING AND OPERATING ENGINEERS' SECTION

. . . . *Continued from page 63* . . . .

the ring guide which is furnished with most units. The inside bore of the ring guide is practically perfect with the original inside bore of the liner. Many engineers fit their rings to the lower part of the liner where the wear is at a minimum. This is also a good method, but the first method seems preferable, inasmuch as it gives excellent results and it is handier to mic up the gap clearance. The question is often asked as to how much end clearance is permissible before affecting engine operation.

In order to obtain maximum efficiency, end clearances must be completely sealed. Experience in fitting up rings again enters into the picture, since friction between rings and liner walls gradually enlarges this end clearance. By the time that rings are properly seated, this end gap often becomes increased by 25 to 50 percent, and when the end clearance becomes excessive, the chances of blowby increase with a drop in efficiency. Therefore, in adjusting your end clearance, you must take into consideration the tension of the ring and the wear in the cylinder or liner wall. The usual practice in Diesel engines is to allow from .002" to .004" per inch of diameter in four cycle engines and .003" to .006" in two cycle engines. The upper rings having a slightly larger gap than the lower rings.

In engines where the cylinder walls and other contributing factors are maintained in good condition, rings made of the proper material, with sufficient radial thickness, should render long and excellent service. It must be remembered that a set of rings travels many millions of feet in the course of a year's operation, and the accompanying friction naturally reduces the face of the ring. Consequently, a ring with good radial thickness will give longer service than a ring of lesser radial thickness, providing all other factors are as they should be. The face width being of secondary consideration.

The foregoing are some of the points to be considered by an engineer in ring replacements. Volumes could be written on the subject and more will be taken up in future articles. But, in summarizing, suffice it to say that if an engineer will keep the factors which cause ring breakage at a minimum, use his past experience in properly fitting his rings, and then use a ring made by a reputable manufacturer, he will find that his ring replacement costs will be greatly reduced, and the efficiency of his units maintained.

Volume Six of the Diesel Engine Catalog will come off the press on August 30th. See pages 10 and 11.

GET ACQUAINTED

A DIGNIFIED and colorful presentation linking its products and applications with production facilities and personnel has been prepared by Donaldson Company, Inc., in the form of a profusely illustrated booklet. Moreover, there's romance in the opening pages of this booklet where in "A Chapter In Dust", the history of the first mechanical device for dust-protecting engines is given. And from there, the development of Donaldson air filters, plant and personnel is traced through twenty-five years. A limited supply of this interesting booklet is available to those readers of DIESEL PROGRESS who would particularly like to have a copy. Write direct to the Donaldson Company, Inc., 666 Pelham Boulevard, St. Paul, Minnesota.

SYNCHRO START PRODUCTS, INC., ANNOUNCES MOVE

FORMERLY of Toledo, Ohio, Synchro Start Products, Inc., manufacturers of automatic control sets for Diesel and spark ignition engines have moved into modern quarters and have increased manufacturing facilities to meet rapidly growing demands and is now located at 221 E. Cullerton St., Chicago, Illinois.

See pages ten and eleven for details of the latest and best book on Diesel Engines.

BUSHEY BUILDING TWO NEW TUGS AND SCOWS

IRA S. Bushey & Sons of Brooklyn, N. Y., have started work on two all-welded steel tugs to be 100′ long, 25′ beam and 12′ deep, each powered with a Fairbanks-Morse 805 hp. Diesel engine. The scows are to be 118′ long, 36′ beam and 10′ deep and of wood construction.

A REPORT ON R.E.A.

. . . . *Continued from page 51* . . . .

of 28,165 kw. Much attention has been given lately to the 25 mobile units described in a recent issue of DIESEL PROGRESS, and very shortly the first completely automatic Diesel plant will go into operation in one of REA's smallest cooperatives in the rock-ribbed hills of Vermont.

None of the plants have been operated for a sufficient length of time to indicate ultimate operating costs. It is clear that the best operating costs can be obtained by building up the loads, and this is being done. With given loads and unit cost conditions, it is an easy matter to give unit operating costs. Some of the plants now show costs well under 1 cent per kwh., and some of the better ones under ¾c per kwh., although a few smaller and less favorably located plants have costs very much higher than that. All of them, however, can be said to be approaching results originally expected.

The REA has had three able Administrators to whom may be credited the enormously satisfactory results. First, Morris L. Cooke, under whose leadership the Administration got its initial impetus. Next, under John M. Carmody, it got into full stride; and now, under Harry Slattery and his two able Deputy Administrators, Robert B. Craig and Frank J. Sette, it is going ahead as an established agency.

It may be said that the Administrator and his entire force of around 1,000 people have the greatest satisfaction in this development, not

only because through their efforts 700,000 farm families and other rural users, or nearly 3,500,000 people are now enjoying electricity and its great advantages which could not have been obtained before at a price they could afford; not only because the farmers are beginning to secure something of the better things of life which is their just due; not only because the farm people are demonstrating their ability to manage big business undertakings with an ability so often claimed as the exclusive property of the business man—but because the cooperatives are demonstrating that individual Americans can cooperate for the good of all and for the extension of that democracy which should be the heritage of all people.

NAVY PLACES MINE SWEEPER ORDER

A CONTRACT totalling $646,000 has been awarded by the Navy to the Dachel-Carter Shipbuilding Company of Benton Harbor, Michigan, for the construction of two 130′ wooden mine sweepers. Propulsion engines will be General Motors Diesels.

DIESEL-ELECTRIC BUSES FOR SCHENECTADY

TEN Diesel-electric buses are to be used by the Schenectady Railway Company to care for the traffic on one of its heaviest capacity lines, running through the business section and out State Street, it has been announced by Abram V. Louer, trustee of the company. They will replace street cars. The buses, of 35-passenger capacity, will be built by the Twin Coach Company and powered by Hercules Diesel Engines, and will incorporate General Electric drive, including electric service brakes. These will be the first electric-drive buses to go into service in Schenectady.

Three dollars buys the new edition of the Diesel Engine Catalog which will be ready to mail on August 30th.

CATERPILLAR Diesel marine engines continue to prove their popularity with western commercial fishermen. A recent repowering of B. L. Maller's 60-ft. "Apache", "San Pedro", with a Model D13000 increased speed to eleven knots at a saving of $9.40 daily fuel cost over the gasoline engine it replaced. As these boats fish on shares, this means cash in the pockets of each California crew member.

BOULDER DAM TOURS BY DIESEL

THE modern Diesel propelled vessel has invaded the desert-surrounded Lake Meade behind Boulder Dam on the Colorado River. The present gasoline driven charter fleet will have as their flagship the 65 ft. twin Superior Diesel engined "Hualapai II," "Ex. Norconian III," built by Fellows and Stewart, Terminal Island, for Captain Bill Clark of Santa Monica, and for the Catalina Island run from that point. The vessel will be operated by the Grand Canyon-Boulder Dam Tours, Inc.

NEW DIESELPAK FILTER FOR COMPOUNDED OILS

LUBER-FINER, Inc. announces the new Luber-Finer Dieselpak, which has been designed expressly for use with compounded oils. In addition to accomplishing the functions of the average filter, it is designed to remove colloidal particles, soot, etc. from the oils without materially removing or adversely affecting the compounds or additives in Compounded Diesel Engine Oils.

The Luber-Finer Dieselpak was developed under the personal direction of Dr. U. B. Bray, B.S., Ph.D., F.A.I.C., nationally recognized authority on all types of oil, whose most recent efforts have been devoted to development of compounded oils.

Exhaustive field and laboratory tests indicate that the new Luber-Finer Dieselpak is as efficient in its own field as is the Standard Luber-Finer Refining Pack, which is used on all types of installations.

A comprehensive technical bulletin on this new development has been prepared and copies may be obtained by writing Luber-Finer, Inc., Los Angeles, California.

★ ★ ★ ★ ★

U. S. Engineer Office, Vicksburg, Miss., has awarded a contract to the Caterpillar Tractor Company, Peoria, Illinois, to furnish one Diesel engine at a cost of $4,071.

★ ★ ★ ★ ★

THE Pacific Lighting Corp. has started construction of a new $85,000 gas compressor plant in the Goleta field near Santa Barbara, California. The four power units are Ingersoll-Rand V-8, 650 hp., angle type, double acting compressors of the most modern design. The main engine building is 124 ft. by 29 ft., and the auxiliary building 58 ft. by 30 ft.

DIESELS REDUCE POWER COST

. . . . *Continued from page 43* . . . .

The five gallons of oil in each Diesel's crankcase can be run through the unit in six hours if the engine is not running. Twelve hours is necessary when the engine is in operation. Every third time the oil is filtered, a point is made to see that the engine is running, as this has the effect of an internal flush. Oil is reclaimed from two engines every day or after every 50 working hours.

Believing that the maintenance of separate battery and charging equipment for each of the Diesel-generating units would be a bother, the charging generators were removed from the engines. The eight Exide batteries were divided into sets of four, connected in series parallel, and put on two four wheel carriages, which also mount the magnetic switch. When it is time to start an engine after it has been shut down over the weekend, the carriage is wheeled up alongside. A plug connects the engine push button switch into the circuit, the necessary

connections to the engine ground and starting motor are made, and the engine is ready to be started. Batteries are charged over week ends by a Wotton Motor Generator, Type YSt-15. Through the week, the unit is used for its major job of charging the batteries of the plant's industrial trucks.

The plant employs a total of 203 motors, 67 of which are industrial types, ranging from ½ to 25 hp., and the remainder fractional horsepower sizes. The connected load totals 366 hp., plus that imposed by a seam welder which takes 50 kva. and nine spot welders each demanding 15 kva.

Mark A. Defibaugh, who reported the figures said, "We are more than pleased. When these engines were installed, they were not expected to do the work that was demanded of them this last winter. Our 1940-41 production, greatest in our history, very nearly doubled that of the previous fiscal year and called for the 24-hour operation of the four units from November to March. The only rest they had was over week ends.

"Having our own power also has other advantages than money savings. At one time during last winter in the height of our season, the power company was shut down for about three hours. We went right on. In previous years, we were more or less frequently bothered with slight interruptions of the power line current which was extremely annoying. We have from one to two thousand electric clocks on test, all manually started. Current interruptions used to stop the clocks and necessitate re-starting them as well as the tests which took a lot of time."

Reserve YOUR copy of the new Diesel Engine Catalog. Use the convenient coupon on page eleven.

FAIRBANKS-MORSE ANNOUNCES SPECIAL BONUSES TO EMPLOYEES

ALL employees of Fairbanks-Morse, except officers, who have been with the Company six months or longer, will receive special bonuses amounting to 10% of monthly wages or salaries, according to an announcement by Colonel R. H. Morse, President.

"These special bonuses will be in addition to those which may be earned under our regular profit sharing plan," said Colonel Morse. In expressing his pleasure in making the announcement, Colonel Morse explained further, "While it is extremely difficult to look very far ahead, it is our hope and belief that business will warrant payment of these bonuses for remaining months of the year."

★ ★ ★ ★ ★

DON Byrd's 50-ft. fishing boat "Princess" has been repowered with 125 hp. 6 cylinder HMR Cummins Diesel with 3 to 1 reduction gear by the Campbell Shipyard, San Diego. Byrd is one of the owners of the tuna clipper "Liberty" and will fish out of San Diego.

RESULTS OF MUNICIPAL ELECTRIC SYSTEMS

UNDER this title, the consulting engineering firm of Burns & McDonnell of Kansas City, Missouri, has just published its seventh edition (1941) of an electric rate book showing the operating records of earnings, output, rates, revenues, valuation, and other information as to the use and cost of electricity in 758 municipally-owned systems.

The volume of 428 pages is illustrated with interesting graphs and tables showing the rates

and revenues, and also gives facts pertaining to the increasing use of electricity and the decreasing cost of electricity in municipal installations. City officials, operators, and managers of both private and municipal systems will find these operating records of much interest and value. Over half the systems in the country have lowered rates since the former 1939 edition. A majority of the cities have no bonded indebtedness on their municipal systems. The type of plant and its management are recorded.

Every complete and authentic record received from municipal systems has been recorded. It is, therefore, a fair, unbiased cross-section of what municipally-owned systems are doing in producing and selling electricity from steam, Diesel, and hydro plants.

It is the only book of its kind published, and as a reference is indispensable to every city official or electricity user who wants to keep abreast of the rapidly changing power rates and conditions.

The book may be obtained at a cost of $5.00, prepaid, from Diesel Progress, 2 W. 45th street, New York, N. Y.

Your name will be imprinted on the front cover of the new Diesel Engine Catalog without charge if your order reaches us before August 30—see pages 10 and 11.

BUSCH-SULZER Bros.-Diesel Engine Company, St. Louis, Mo. has received an order from the Navy Department to furnish four sets of propelling machinery for minesweepers at a total cost of $1,180,000. They also received an order amounting to $8,125,560 for twelve sets of machinery for minesweepers.

QUINCY COMPRESSOR CO. ANNOUNCES NEW COMPRESSOR SELECTOR

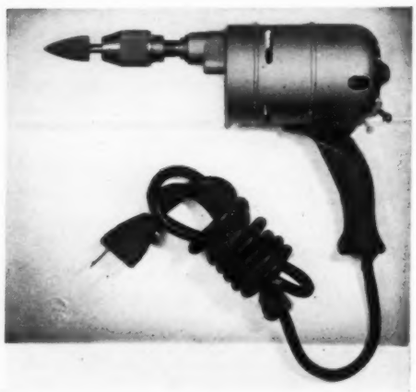
A NEW and revolutionary Air Compressor Selector is being currently announced by the

Quincy Compressor Co. R. Lehr, Sales Manager of the Company, points out that the new Selector was especially designed to aid in selecting the correct size and type of compressor for a specific job in one simple setting.

This new Compressor Selector functions like a slide rule. One setting of the scale shows correct compressor model number, free air delivery, r.p.m., piston displacement, and motor horsepower required. The Selector also contains figures for making allowances for loss in free air delivery at high altitudes. Tests have proved that the Selector is extremely accurate for both air and water cooled compressor applications requiring up to 80 cu. ft. displacement. Pressures covered by the Compressor Selector range from 30 to 250 lbs.

This is the first time, according to the company, that a Selector of this type has ever been worked out. Its application in the solution of compressor problems is effectively simplifying the work of purchasing agents, engineers, architects and salesmen in selecting the right size and type air compressor for specific applications. The new Selector saves valuable time by supplanting performance curves, tables, etc. These new Compressor Selectors can be obtained free of charge by writing the Quincy Compressor Co., Quincy, Illinois.

A NEW ALL-PURPOSE ELECTRIC TOOL



A VERSATILE electric tool, combining light weight, remarkable power and flexibility is announced by Paramount Products Co. The standard model utilizes fifty different accessories and the two-speed model, uses two hundred. The tools are readily adaptable for drilling, grinding, wire-brushing, sanding, polishing, sawing, shaping, etching, engraving and carving all sorts of materials from tools and dies to jewels. Write Paramount Products Co., 545 Fifth Ave., New York, N. Y., for the folder describing its new "Whiz" electric tool.

Volume Six of the Diesel Engine Catalog will come off the press on August 30th. See pages 10 and 11.

DIESELS for tuna clipper net boats is something new and emphasizes the increasing popularity of the light-weight, high-speed Diesel for this type of workboat. At the San Diego yard of the Campbell Machine Co., a 40 hp. Buda has been installed in the clipper "Liberty's" net dory.

DIESEL GENERATOR ORDER GOES TO U.S. MOTORS

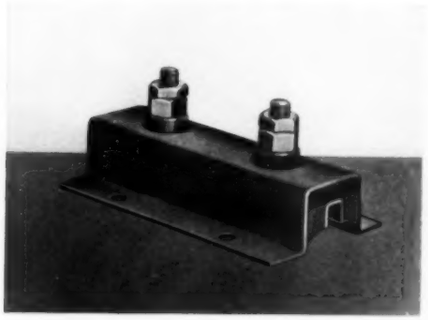
U. S. Motors of Oshkosh, Wisconsin, has received a contract from the U. S. Engineer Office covering a Diesel-electric generating set for the towboat "Ft. Armstrong" out of Marietta, Ohio.

★ ★ ★ ★ ★

THE first of three Superior Diesel powered baby tuna clippers to be built by Frank Hodson, Terminal Island, California, for San Diego fisherman is in frame. Main engine is an 8 cylinder, 310 hp.; auxiliaries are 60 and 80 hp. driving generator sets of the same make. Main engine is of the reduction gear type, 2.54 to 1.

NEW KORFUND ISOLATORS

IN addition to the complete line of natural cork and steel spring resilient mountings for reciprocating and rotating machinery, the Korfund Company, Inc., announces several new types of isolators employing rubber as a cushioning medium. These will be of particular interest to builders and users of small engines and relatively light weight machinery.



Korfund rubber in shear is a safety mounting incorporating the same degree of design and isolation load capacities for individual units ranging from 25 pounds to 450 pounds. If necessary, two or more of these mountings may be combined in steel housings when greater load capacities are required.

Korfund rubber in compression is a compression type of mounting suitable for concentrated loads. A substantial saving in size and cost can be effected wherever the lesser deflection of rubber-in-compression is permissible. Both top and bottom steel sections are securely bonded to the circular rubber stock. Load capacities range up to 1200 pounds per mounting. If desired, this unit may also be used as a shear-mounting by bolting the base plate in a vertical direction.

Korfund rubber mountings are also available in extended structural integral bases. Thus, a common sub-base for driving and driven machinery can be provided with which perfect alignment between two machines can always be maintained. No other integral base is nec-

See pages ten and eleven for details of the latest and best book on Diesel Engines.

essary and exact load distribution is achieve by correctly spacing the isolators within th steel members.

These new Korfund rubber isolators have bee developed to meet an increased demand fo scientific isolation of vibration and noise in th lower loading ranges. Although not quite a durable as steel springs, they are just as eff cient when properly used and their economi will appeal to many users of relatively ligh weight equipment. Write the Korfund Co. Inc., Long Island City, N. Y., for complete in formation.

Three dollars buys the new edition of the Diesel Engine Catalog which will be ready to mail on August 30th.

J. DePUY & Son, San Antonio concern under Government contract to do repair work in Galveston's north and south jetties, has just issued a contract to The Gulf Marine Ways Inc., Galveston, Texas, to build a 75 ft. Diesel towboat. This boat will be built of wood and will be propelled by a 250 hp. Fairbanks-Morse engine.

NEW ALL DIESEL TUG FOR WEST COAST

SOMETHING new in harbor and river service is the new all-welded steel towboat by Pacific Coast Engineering Co. of Alameda, California, for San Francisco Towing Co. The 64 ft. craft will have a 400 hp. Enterprise Diesel turning Pitchometer wheel and a Fairbanks-Morse Diesel as auxiliary for fire and service pumps and 5 kw. generator.

BURGESS ANNOUNCES NEW CONFERENCE ACOUSTI-BOOTH

THE Burgess Model 501 Conference Acousti-Booth, for use in noisy plants where a quiet conference place is necessary, has just been announced by the Burgess Battery Company, Acoustic Division, 530 West Huron Street, Chicago, Ill. Similar in construction to the Bur-

gess Telephone Acousti-Booth, this new conference booth has walls of sound-absorbent construction to soak up factory noise.

It is designed to meet the need for a large "zone of quiet" for conferences in noisy factories, for use where several telephones may be installed in one location, and for testing operations such as listening for noise in electric motors. It may even be used as a temporary miniature office in new or remodeled factories where construction is not complete.

Sound absorbing walls in the conference booth blot up extraneous noise and allow persons within to carry on work without noise interference. The doorless entrance at each end permits ready access to the booth and provides ample natural ventilation. Acoustic construction of the booth makes doors unnecessary. A folding table—23½" x 24"—and overhead electric light fixture add to its convenience. It is easily portable, can be assembled and ready for use in a few minutes time and is constructed of heavy gauge steel and finished in black wrinkle finish on the exterior, with gray interior. Outside dimensions are 56½ in. long, 54½ in. wide, 79½ in. high. Shipping weight 1000 lbs.

Volume Six of the Diesel Engine Catalog will come off the press on August 30th. See pages 10 and 11.

Reserve YOUR copy of the new Diesel Engine Catalog. Use the convenient coupon on page eleven.

AN ATLAS DIESEL GOES TO MEXICO

THE new refrigeration plant at Topalabompo, Mexico, now under construction, will be powered with Atlas Imperial Diesel engines. Refrigeration equipment is by Kohlenberger Engineering Co., Anaheim, California.

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

Conducted by C. CALVERT HINES*

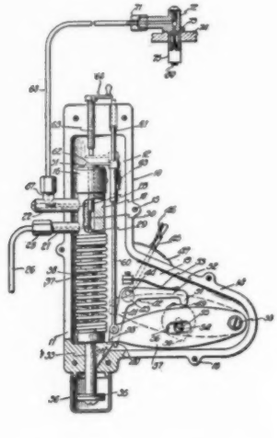
2,195,037

FUEL METERING AND INJECTING DEVICE FOR INTERNAL COMBUSTION ENGINES

Vern Reed Petty, Brooklyn, N. Y., assignor to Petty Diesel Engine Corporation, Brooklyn, N. Y.

Application April 6, 1937, Serial No. 135,25[illegible]
5 Claims. (Cl. 103—37)

1. A device for injecting fuel at high pressures into the combustion chamber of an internal combustion engine comprising an elongated body having a bore of a uniform diameter extending longitudinally therethrough, a fuel inlet, a fuel outlet disposed above said fuel inlet, both said fuel inlet and said fuel outlet opening into said bore, a check valve in said outlet, a floating plunger slidably mounted in the top of said bore and closing said outlet when in lowered position, a compression plunger slidably mounted in the lower end of said bore and having its inner end disposed below the plane of said fuel inlet when said compression plunger is in lowered position, the inner ends of said plungers being disposed in spaced relation to provide a fuel measuring and compression chamber, spring means tending to move said compression plunger upwardly to close said inlet and compress a charge of fuel taken into said fuel chamber, releasable means acting to secure said compression plunger in lowered position against the tension of said spring means, adjustable stop means for limiting the upward movement of said free



floating plunger to a position clear of said outlet during the upward compression movement of said compression plunger, stop means for limiting the upward movement of said compression plunger after it has traveled upward a distance to close said inlet and for a distance relatively greater than said floating plunger to compress a charge of fuel within said compression chamber, actuating means for operating said releasable means to enable said spring means to move said compression plunger upwardly, means for subsequently returning said compression plunger to lowered position against

* Patent Attorney, 811 E Street, N.W., Washington, D. C.

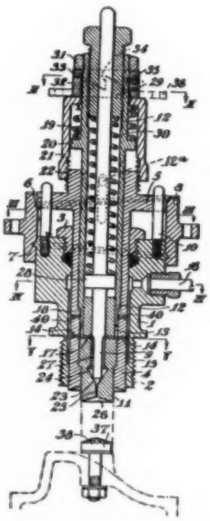
e action of said spring means to be engaged d held by said releasable means for subse- ent release by said actuating means, and djustable means for regulating the operation said releasable means in variable timed lation to said actuating means.

2,197,944

OMBINED FUEL PUMP, INJECTION AND SPRAY JET FOR USE WITH AN IN- TERNAL COMBUSTION ENGINE

rthur Robert Fenton Raven, Hong Kong, China

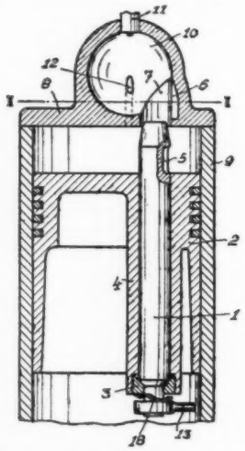
pplication June 20, 1939, Serial No. 280,147
In Great Britain September 13, 1937
5 Claims. (Cl. 123—139)



1. A combined fuel pump and injector for in- rnal combustion engines of the compression gnition type comprising a barrel, a pump lunger within said barrel and reciprocable elative thereto, means limiting inward move- ent of said plunger relative to said barrel, id pump plunger, when at its limit of inward ovement in said barrel, being disposed to be ngaged and to be moved outwardly in said arrel by an abutment on the engine piston uring the final portion of the outward stroke f the piston, the inner end portion of said lunger having a liquid tight relationship to id barrel, the outer end portion of said lunger being spaced from said barrel, a sleeve xtending into the space between the outer end ortion of said plunger and said barrel and ooperating with said barrel and plunger to rovide therebetween a liquid fuel chamber the uter end of which is defined by the inner end

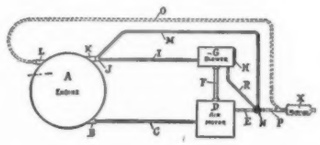
of said sleeve, means for the supply of fuel to said chamber when said plunger is at its limit of inward movement in said barrel and for the cutting off of the fuel supply to said chamber when said plunger is moving outwardly in said barrel, said plunger having an axial bore and a transverse duct providing constant communication between said bore and the inner end of said fuel chamber, said plunger also having a fuel outlet orifice and an outwardly facing valve seat disposed inwardly with respect to said duct and in constant communication through said bore with said duct, a valve cooperating with said valve seat to control flow of fuel from said bore through said orifice, said valve having a stem disposed in said bore and liquid tightly fitting said bore outwardly with respect to said duct so that under the influence of a predetermined pressure of the liquid fuel when the valve is seated and the plunger is held against inward movement the valve is moved outwardly relative to the plunger and thereby is unseated, spring means resisting outward movement of said valve, and other spring means resisting outward movement of said sleeve, said spring means being of strengths relative to each other such that the pressure of the liquid fuel developed by outward movement of the plunger in the barrel is effective to impart outward opening movement to the valve prior to outward movement of the sleeve.

2,187,857
INTERNAL COMBUSTION ENGINE
George Stephen Kammer, Budapest, Hungary
Application June 27, 1938, Serial No. 216,089
IN GERMANY May 25, 1938
5 Claims. (Cl. 123—33)



1. An internal combustion engine comprising in combination a working cylinder, a combustion chamber separate therefrom but connected to it by at least one passage, a fuel nozzle terminating in the combustion chamber, a piston operating within the cylinder, an adjustable member mounted on the piston and entering the passage communicating with the combustion chamber so as to throttle this passage when the piston is at its inner dead center and to release such throttling at a predetermined rate when the piston is moving away from said dead center, and speed responsive means for varying the position of the adjustable member to increase the area of the throttled passage with increases in the engine speed and vice versa.

2,194,913
INTERNAL COMBUSTION ENGINE
Frank A. Rossi, Astoria, N. Y.
Application May 15, 1939, Serial No. 273,663
3 Claims. (Cl. 60—15)



1. In combination with an internal combustion engine having an air jacket surrounding the engine cylinders, an air motor arranged to receive and be driven by the exhaust pressure gases from such cylinders, air cooling means comprising an air blower driven by said air motor and connections between said blower and said air jacket for delivering the atmospheric air discharged by said blower into the air jacket of the engine, means adapted to deliver spent engine gases from said air motor to said air cooling means and means for controlling the engine gases delivered to said air cooling means.

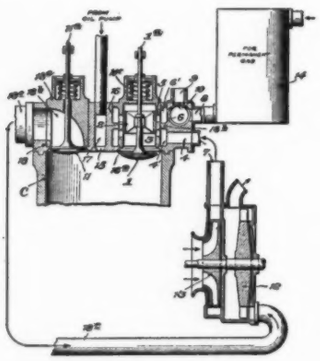
DIESEL PROGRESS

2,198,516

COMBUSTION ENGINE

Alfred Schutte, Augsburg, Germany, assignor to Maschinenfabrik Augsburg-Nurnberg A. G., Augsburg, Germany, a corporation of Germany

Application December 28, 1937, Serial No. 182,082
In Germany December 28, 1936
1 Claim. (Cl. 123—27)



In an internal combustion engine, a cylinder head having a set of three passages therethrough and extending from the outer face of the head to the inner face thereof, one of said passages having a reduced lower end forming a downwardly facing valve seat, said passage having an internal annular rib intermediate its ends providing inner and outer annular channels, a cylindrical valve cage in said passage and closing the upper end thereof, said cage being seated on the reduced lower end of the passage and having said rib engaging its outer surface intermediate its ends, said cage having a set of ports affording communication between the outer channel and the interior of the cage, and having a second set of ports affording communication between the inner channel and the interior of the cage, said head having an upper and a lower lateral passage leading from respective channels for admitting gas and air to said channels, valve means in the upper passage controlling gas flow therethrough, a sleeve valve slidable in said cage to open and close said ports, a stem carrying said valve, a poppet valve fixed to the lower end of said stem to open and close the lower end of the cage, the for admission of Diesel fuel, said head having an exhaust port leading laterally from the third passage, and an exhaust valve fitted in said second of said set of passages forming means third passage.